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ABSTRACT

In the fall of 1966, the School Mathematics Study Group embarked upon a four-year longitudinal study of mathematical learning in the primary grades, the Elementary Mathematics Project (ELMA). The primary purpose of the study was to assess children's progress in learning particular mathematical ideas during the beginning school years. This volume contains information related to the grade 2 tests. The first part of the volume contains procedures for giving the tests and the test batteries. The second part of the volume contains the description and statistical properties of the grade 2 scales derived from these test batteries. (RH)

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MATHEMATICS
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ELMA TECHNICAL REPORTS

No. 3

Grade 2 Test Batteries, Description and Statistical Properties of Scales

SE 022 999

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FOREWORD

In the fall of 1966, the School Mathematics Study Group embarked upon a four-year longitudinal study of mathematical learning in the primary grades, The Elementary Mathematics Project (ELMA). The primary purpose of this study is to assess children's progress in learning particular mathematical ideas during the beginning school years. With these findings, the possibility exists of developing, in the future, more effective materials and procedures for teaching children coming to school with differential pre-school experiences as well as better understanding young children's learning of mathematics.

The pilot phase of this longitudinal study was undertaken from 1964 to 1966 in the Special Curriculum Project* during which time the tests for kindergarten and Grade 1 were developed, pre-tested, and modified.

The study population included approximately 2,000 children entering kindergarten in September, 1966, in selected schools in two large cities. The schools selected met two criteria: they drew on residential areas which were predominantly either lower or middle income groups, and each particular group of elementary schools fed into a common junior high school. Within one city, four cells were formed, two each from lower income areas and two from middle to higher income areas. One lower and one middle income cell were using the School Mathematics Study Group curriculum, and the other comparable cells were using the Science Research Associates program which is the state adopted mathematics textbook series in California for the primary grades. In the second city, three cells were formed, the omitted cell being the middle income SMSG curriculum group. The data in this volume are reported for City 1.

The children were tested twice a year, one battery in the fall and another in the spring, starting in kindergarten and extending through Grade 3. The format of the tests gradually moved from individually administered, object-oriented

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*The two SMSG publications which report on the Special Curriculum Study are: Leiderman, Gloria F., Chinn, W. G., and Dunkley, M. E., SMSG Reports No. 2, The Special Curriculum Project: Pilot Program on Mathematics Learning of Culturally Disadvantaged Primary School Children. Stanford University, 1966; and Chinn, W. G. and Summerfield, Jeanette O., SMSG Reports No. 4, The Special Curriculum Project: 1965-1966. Stanford University, 1967.

tests to group administered, printed tests as the children became better able to comprehend and attend to printed materials and verbal directions in a group situation. Various standardized intelligence tests (one per year) were also administered by EIMA in the middle of the first three school years. Attitude scales were given in Grades 2 and 3. In addition, the results of standardized tests administered by the school systems participating in EIMA were obtained and included in the data analyses.

Test administrators were carefully chosen for each battery from graduate students and primary teachers with course work or experience in psychological testing plus experience in working with young children. All testers were required to attend training sessions before each test battery. Throughout the training sessions, emphasis was placed on the importance of careful adherence to the instructions when giving the tests.

GUIDE FOR THE USE OF THIS VOLUME

The first part of this volume contains the test batteries which were administered during the third year of the Elementary Mathematics Project. The Introductions to the Grade 2 Fall, Winter, and Spring Test Batteries on pages 3, 59, and 91 describe the format and information to be found in this part of the report.

The second part of this volume contains the description and statistical properties of the Grade 2 scales derived from these test batteries. Figure 1 is a sample page from this part of the report. The information for most scales is in this basic format.

A Key for explaining Figure 1 follows:

1. Grade Level and Time of Administration. Two pieces of information are indicated for each scale: (1) the grade level of the students taking the scale, and (2) whether it was given in the fall, winter, or spring.

2. Form Number. The form number of the test in which the scale is included.

3. Scale Identification Code. Each code number consists of a three-digit number. The first digit indicates when a scale was administered: "4" for the fall of the third year and "5" for the spring (and late winter) of the third year. The second and third digits number the scales within a test battery. For instance, scale code 510 indicates a scale from the spring, third year test battery which is scale number 10 from that battery. Not all code numbers used during the third year of the study are reported in this volume. (Those assigned for internal identification purposes are not included.)

Grade 2 (1)
Spring

(2) Form 2-05
(3) Scale 510

510 (4) COMPUTATION - (5) ADDITION (8 items)

(3) This scale is designed to assess the pupils's primary knowledge of addition facts and the addition algorithm. The items range from basic 1-digit combinations, requiring only simple recall or counting, to the addition of two 3-digit numbers, requiring regrouping. (6) Items are presented in both sentence and vertical formats, and each item required a constructed response. The scale is an extension of 518, 530, and 531.

The items which make up this scale come from Form 2-05 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

(7) Items 4 - 11 Pages 190, 191

SCALE STATISTICS:

(8) NUMBER OF CASES	=	885
(5) NUMBER OF ITEMS	=	8
(9) MEAN TOTAL SCORE	=	5.134
(10) STANDARD DEVIATION	=	2.098
(11) CRONBACH'S ALPHA	=	0.773
(12) ERROR OF MEASUREMENT	=	1.000

ITEM STATISTICS:

(13) ITEM	(14) P'S	(15) ADJ. P'S	(16) N.S. BIS	(17) PERCENT NT
4	0.927	0.941	0.670	1.582
5	0.765	0.828	0.757	7.571
6	0.751	0.822	0.650	8.588
7	0.855	0.877	0.728	2.486
8	0.658	0.715	0.762	8.023
9	0.241	0.297	0.523	18.983
10	0.610	0.668	0.651	8.701
11	0.328	0.437	0.614	24.372

Figure 1

4. Scale Name. The scale name is usually descriptive of the content of the scale (e.g., Whole Number Comprehension, Place Value, or Identifying Triangles). In some cases an S (either alone or followed by a number) follows the scale name to indicate a shortened scale that includes only selected items from another scale. If only one scale within a test battery is composed of a sub-set of items, an S follows the scale name. If more than one shortened scale is reported, each new sub-set is assigned a sequential number after the S.

5. Scale Length, Sub-Group Information and Type Administration. The number of items in the scale is indicated in parentheses following the scale name. This number is also reported in the second line under the Scale Statistics. If the scale was administered to less than the entire population, the nature of the sub-group is indicated.

6. Scale Description. A brief description of the scale is given, telling what the scale is designed to measure, and giving any special information about the scale. In particular, cross-referencing is given to other scales that are the same as the scale being described. This cross-referencing is done across years. If a scale is an extension or shortened form of another scale within a test battery, that information is also noted.

7. Item and Page Reference. The item numbers and the pages in the first part of this report where the items are reproduced are recorded for reference.

8. Number of Cases. The data in this volume are reported on the total number of students to whom the scale was administered in the test center which had all four cells (low income-SMSG, low income-SRA, middle income-SMSG, and middle income-SRA, i.e., City 1).

9. Mean Total Score. This is the mean for scale scores. For scales made up of dichotomous items, the scale score is the number of items correct. For attitude scales, the responses for each item are assigned values which range from 1 for the most negative response to 5 for the most positive response. This procedure includes reversal of the order of assigning values to responses (flipping) when the item stem is a negative statement. The item scores are summed to produce the scale score.

10. Standard Deviation. The standard deviation of scale scores.

11. Cronbach's Alpha. The coefficient alpha is an estimate of the internal consistency reliability of the scale.

12. Error of Measurement. The standard error of measurement of a scale is an index of the extent to which scores would vary over similar tests. It is a function of the standard deviation and alpha,

$$(\text{ERR.MEAS}) = (\text{ST.DEV}) \sqrt{(1.0 - \text{ALPHA})}.$$

It can be used to establish a confidence interval around an obtained score to estimate the region in which a true score probably lies.

13. Item. This is the number of the item for which the statistics are reported. Page references for all items in the scale are given in 7 above.

14. Item Mean. P is the mean on the item for all students in the sample.

15. Adjusted Item Mean. ADJ. P for an item is the mean for all students who attempted the item. Not tried responses eliminate the student from the calculation of ADJ. P. An item is defined as not tried if there was no response to the item.

16. Biserial (or Serial) Correlation. N.S. BIS is given as an index of item discrimination for items scored right or wrong. The serial correlation is given as an index of item discrimination for attitude (more than two response) items. The biserial correlation is a special case of the serial correlation.

In general, the biserial correlation is a correlation between a discrete variable (e.g., a test item) and a continuous variable (e.g., a total test score.)

The biserial and serial correlations given in this volume are non-spurious. That is, these correlations are between the item and the total scale score with the item removed. These non-spurious correlations are sometimes referred to as "item vs. item-remainder correlations," the correlation of the item with the remainder of the scale.

17. Percent Not Tried. The percent of students for whom the item was not tried is indicated by PERCENT NT.

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GRADE 2

FALL TEST BATTERY

FORM 2-01

INTRODUCTION

Grade 2 - Fall Testing

Form 2-01

Form 2-01 was designed to measure retention of mathematical ideas included in the Grade 1 program. The battery was given during the first week of school to a sample of the second grade students participating in the study. The sample consisted of 335 students (approximately one-fourth of the total ELMA sample). All of the students chosen for testing were from six schools in the test center which had all four cells (low income-SMSG, low income-SRA, middle income-SMSG, and middle income-SRA) active in the study. The schools were chosen so that an approximately equal number of students were in each of the four cells.

The test is made up of selected scales previously administered in the spring Grade 1 battery (Forms 1-03, 1-04, and 1-05)*; no new test material was presented. The battery consisted of printed, group administered tests, although all items were still read by the tester as well as being printed in the booklets. Form 2-01 was administered to small groups of five or six students at a time. It took approximately one hour to administer.

Because the testers were chosen from those who had previously administered the spring Grade 1 battery and because all scales used in Form 2-01 were taken from that battery, no tester training session was felt to be necessary. The directions to the testers concerning preparations for testing, general rules to follow, etc., are reproduced on the following pages.

The test has been reproduced exactly as it was given with two exceptions. (1) Originally, the items in Form 2-01 were not numbered (although the item numbers did appear as part of the page number in the upper right corner of the page). For the reader's information, item numbers enclosed by parentheses have been added where more than one item appears on the page. (2) In the original 2-01 booklets, the items were printed only on the right-hand page, leaving the left page blank. In this report, Form 2-01 is printed on both pages.

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*See ELMA Technical Report No. 2, Grade 1 Test Batteries, Description and Statistical Properties of Scales.

SCHOOL MATHEMATICS STUDY GROUP
ELEMENTARY MATHEMATICS PROJECT

FORM 2-01
Fall Inventory, 1968 --- Grade 2

General Instructions for Testers

Our purpose in testing this fall is to ascertain how much the students have forgotten during the summer vacation. Children in only a limited number of schools are to be tested. One group test will be administered. All the items in the test have been selected from the three group tests administered this spring.

Testing will begin on Thursday, September 12, and hopefully will be completed by the end of the following day, Friday, September 13. In some cases it may be necessary to finish the testing early the next week, but we are anxious that the tests be given before the students are exposed to too much review or classroom instruction.

It is essential that all testers follow exactly the same procedure in administering the tests. Read the Directions for Administering Form 2-01 carefully before the first day of testing. You will already be familiar with the instructions and with the tests, but if you should have any questions, be sure to call us collect at Stanford: 321-2300, Extension 2681. Ask for Terry Chay or Diana Scheffler.

We will notify the school principal to expect you on September 12. If for any reason you should not be able to test after all, please notify the principal and immediately call us collect to let us know.

Otherwise, you should, as always, check with the principal on your arrival at the school. You should ask the principal whether the children may return to the classroom by themselves or whether they should be accompanied by the tester. It is important that the children miss as little classroom time as possible, and should be taken or sent back to their classroom (depending on school policy) immediately after testing has been completed. Children may not leave the school grounds under any circumstances while under your supervision.

The roster lists all the children we would like you to test. For each child, there is a labeled booklet. It is quite possible that some of the children on the roster have not returned to school this fall. In this case, and in the case of any absentee, please return the blank booklet with the rest, and note on the roster that the child has transferred or is absent. There is no need to return to a class to test any children that were absent on the first day of testing.

We wish to test only those students who are in the first semester of second grade. If any children have been retained in first grade or have been accelerated beyond the first semester of second grade, do not test them but note that fact too on the roster.

Please check off the name of each student on the roster as you test him. When you have completed testing, record in the box on the front page of the roster the number of hours you have spent testing. Return the roster to us as soon as you can, in the envelope provided. You will be paid at the rate of $6.00 per hour. The roster is, in effect, your time sheet; therefore, it should be returned separately.

At the end of testing, repackage all answer booklets, blank and used, in the box in which they arrived. Use the tape we have provided to reseal it, and affix our address label over your own address. The stamps we have provided will adequately cover the cost of mailing.

We regret having to ask you to visit the post office to mail such a large package. Unfortunately, the testing is on too small a scale this time to warrant the expense of a person picking up the materials at the schools.

We would appreciate a telephone call from you when you have finished testing and mailing. Sometimes the mail is slow, and we would like to know as soon as possible when testing is complete.

SCHOOL MATHEMATICS STUDY GROUP

ELEMENTARY MATHEMATICS PROJECT

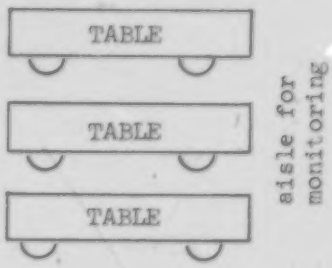
FORM 2-01

Fall Inventory, 1968 --- Grade 2

GENERAL DIRECTIONS FOR ADMINISTERING GROUP FORM 2-01

1. Setting for Administration of Tests

As with the previous tests you have given, you will need a separate room. Seating arrangements for the test are especially important for several reasons: first, to eliminate all possibilities for copying; second, to minimize one child's distracting another; and third, to permit you more easily to monitor all of the children in the group. You will need five (or six) separate desks at which the children may work. If separate desks are not available, one alternate is to carefully space children at several long tables. These diagrams show two possible arrangements:



If the room is small and the children must work at tables, place standing folders or boxes between them as barriers. Do not have the children facing each other across tables.

Since we cannot foresee all possible problems in physical arrangements, we will rely on your ingenuity to make certain that each child's responses are independently arrived at.

2. Materials

Directions for administering Form 2-01

Alpha-by-school roster

Pupil answer booklets

Pencils

3. Procedure

The student roster is printed in alphabetical sequence by school, rather than by class, since we have no way yet of knowing the class structure. The labeled answer booklets have been packaged in the same sequence so that you will be able to find particular booklets more easily.

When you arrive at the school for testing and check with the principal, you should ask him for the names of the second grade teachers. Consulting either with each teacher, or with the principal you will be able to determine which students are in each class.

In general, administer this test to five children in a group. However, in no instance give the test to a group larger than six. In selecting the group of five children for testing, try to minimize disruption of classroom activity. In all instances comply with the teacher's wishes in selecting the set of children to be taken for the group testing.

Read over, several times, the instructions for administering the test to become familiar with the items and the directions before you start testing.

4. Important Considerations

(a) It is imperative that you adhere to the written directions as closely as possible. Do not change the wording on any item. We are interested in determining if the children understand the terminology that is used in the test.

(b) It is imperative that you monitor the children in the group testing situation by walking around and making certain that each child understands, is on the right page and item, and is marking only one response to each item. Also, the monitoring will permit you to make sure that each child is working independently of the other children in the group.

(c) Atmosphere should be as anxiety-free as possible. Set the tone by talking to the children as they enter the examination room and are being seated at prearranged desks.

5. Test Administration

Form 2-01 has 26 items which require instructions to be read by the tester. The remainder of the items are to be done by the children by themselves without any reading of instructions for separate items.

The tester's manual for Form 2-01 begins with the 20 pages that are to be read to the children exactly as they are written (except the word "pause"). On pages 3, 5, 7, 9, and 12 of the tester's manual,

you will notice that a line has been drawn through the words which are printed in the children's answer booklets. In each case, slightly different words have been typed in for you to read instead. These instructions which you will read are a little more explicit than the ones which appear in the students' answer booklet.

Children are not to turn the page until you tell them to do so. Watch children to be sure that all are on the page corresponding to the one that is to be read. Following these pages, there is a page of instructions that is to be read to the children before they do the remainder of the test, which is the computation section of the test. The computational tasks are to be completed at the child's own rate.

Those children who finish first will be given a page with dot-to-dot activity to occupy them until the rest of the children have finished. The slower children will also be given this page when testing has been completed. All children can keep these pages. (This activity only serves to keep the fast children from disturbing the slower children.)

Directions are to be read slowly and distinctly as the tester circulates among the children. You will note that each instruction is read at least twice so that the tester is able to detect those children who do not understand. With each instruction, circulate through the group to see that each child understands what is meant. Allow several seconds after the final item instructions for all children to respond before saying "NOW TURN TO THE NEXT PAGE." Make sure that all children are on the correct page before beginning instructions for that page. If a child indicates that he does not know an answer, say: "MARK THE ANSWER YOU THINK IS RIGHT." However, do not insist that the child make a response. Do reassure him that there may be a question not yet covered in class, but give no further hints.

In the event a child wants to change his response, make sure he has erased the original response before marking another.

If a child talks during testing period, the tester reminds him reassuringly that he is not to talk, that you will know which answer he thought was the correct one when you look at his booklet.

After testing has begun, children do not usually look up to watch the tester's demonstrations; hence it may be necessary for you to point to the "top" and "bottom" of a child's paper when you find him recording answers in the wrong area.

Tell the children they are not to do the item on the bottom half of each page until you tell them to do so. Repeat this statement during the test until all children have learned to wait until you have read each question to them before marking their booklets.

The sample page (page 1 of manual and pupil booklet) is to be used for helping the children to understand the directions, vocabulary, and format of the test to follow. Try to make certain that any questions the children may have about "top" and "bottom," marking, etc., are answered in doing this sample page. Be sure that the child marks one item and only one in each row. Do not tell the child whether his answer is correct. The sample page is being used only to teach the child the method of marking his answers in his booklet.

TESTER'S MANUAL - FORM 2-01

After the children are seated, tell them "I AM GOING TO READ YOU SOME QUESTIONS. I WANT YOU TO ANSWER THEM BY PUTTING MARKS IN THE BOOKLETS THAT ARE IN FRONT OF YOU ON THE TABLE. PLEASE DON'T TURN ANY PAGES IN THE BOOKLETS UNTIL I TELL YOU TO DO SO."

"NOW, OPEN YOUR BOOKLETS." (Watch to be sure that each child has opened his booklet to the sample page.)

Say: "I AM GOING TO ASK YOU SOME QUESTIONS. YOU ARE TO MARK THE ONE THING ON YOUR SHEET THAT BEST ANSWERS THE QUESTION. DO YOU KNOW WHAT MARK MEANS?" (Pause for responses and reinforce those responses offered by children. They may use any system of marking that is familiar to them, i.e., circle, cross, ex, underline, etc.). "YES, YOU MAY (CIRCLE, CROSS, ETC.) THE ANSWER YOU THINK BEST ANSWERS THE QUESTION."

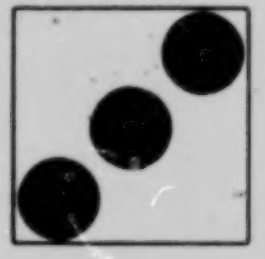
"IF YOU NEED THINGS TO COUNT, USE YOUR FINGERS OR MAKE MARKS ON THE PAGE. LISTEN CAREFULLY TO THE QUESTION, THEN MARK THE ANSWER. ARE YOU READY? (Tester reads the first of the sample questions given in the tester's manual and continues as indicated.)

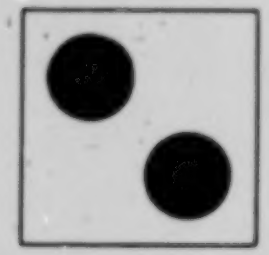
Sample Page

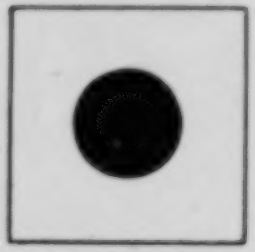
THIS PAGE HAS TWO QUESTIONS. LOOK AT THE PICTURES AT THE TOP OF THE PAGE. DO YOU KNOW WHAT I MEAN BY "TOP" OF THE PAGE? (Explain if there are children who do not know top.) LOOK AT THE PICTURES AT THE TOP AND LISTEN TO THE QUESTION.

WHICH PICTURE HAS THREE DOTS?

MARK THE PICTURE THAT HAS THREE DOTS. MAKE A BIG MARK THAT IS EASY TO SEE. (Pause while all children finish.)







12

NOW LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE. LISTEN TO THE QUESTION. WHEN YOU ARE COUNTING,

WHAT NUMBER COMES AFTER FOUR?

MARK THE NUMBER THAT COMES AFTER FOUR. (Pause while all children finish.)

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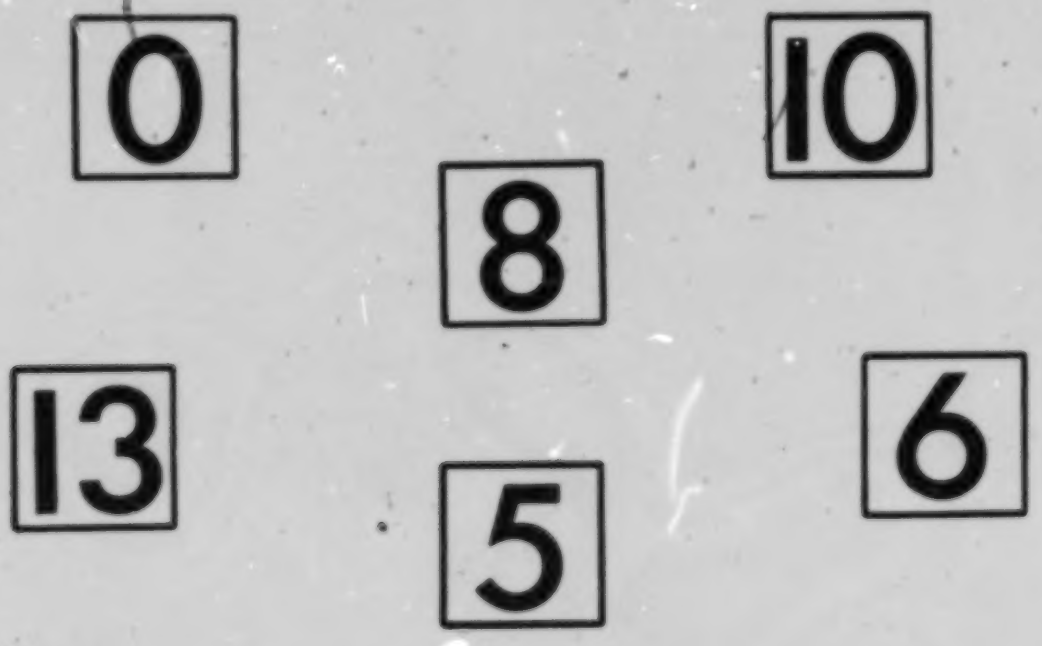
VERY GOOD. NOW, TURN TO THE NEXT PAGE.

REMEMBER, LISTEN TO THE QUESTION, THEN MARK THE ANSWER ON THE BOOKLET. (Make sure each pupil has page 2-1.) SEE THE NUMBERS ON THIS PAGE?

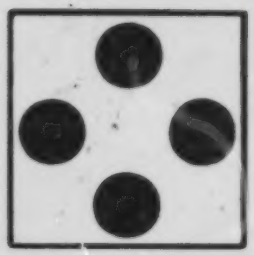
WHICH NUMBER IS LARGEST?

MARK THE NUMBER THAT IS LARGEST. (Pause.)



NOW, TURN TO THE NEXT PAGE.

LOOK AT THE PICTURE AT THE TOP OF THE PAGE. SEE THE PICTURE AT THE TOP?

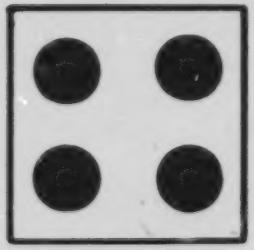


NOW WHICH PICTURE AT THE BOTTOM OF THE PAGE HAS FEWER DOTS THAN THE PICTURE AT THE TOP? (Pause)

14

WHICH PICTURE BELOW HAS FEWER DOTS THAN THE PICTURE AT THE TOP?

MARK THE PICTURE WHICH HAS FEWER DOTS. (Pause)



27

NOW, TURN TO THE NEXT PAGE.

THIS PAGE HAS TWO QUESTIONS. LOOK AT THE NUMBERS AT THE TOP OF THE PAGE.
SEE THE NUMBERS AT THE TOP?

WHICH NUMBER IS BETWEEN EIGHT AND FIVE?

MARK THE NUMBER THAT IS BETWEEN EIGHT AND FIVE. (Pause)

15

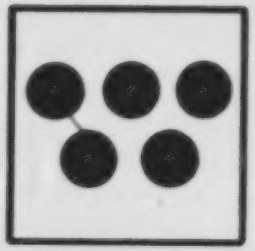
NOW LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE. SEE THE NUMBERS AT THE BOTTOM?

WHICH NUMBER IS BETWEEN FOUR AND SEVEN?

MARK THE NUMBER THAT IS BETWEEN FOUR AND SEVEN. (Pause)

NOW, TURN TO THE NEXT PAGE.

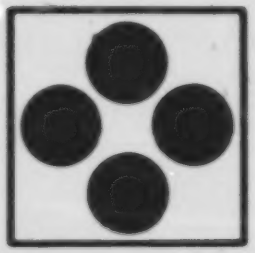
LOOK AT THE PICTURE AT THE TOP OF THE PAGE. SEE THE PICTURE AT THE TOP?

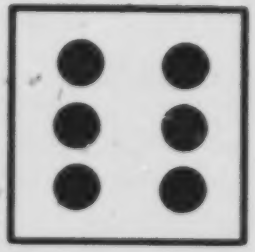


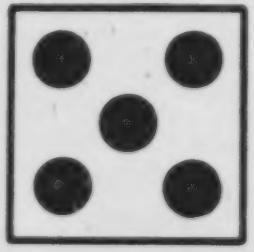
WHICH PICTURE AT THE BOTTOM OF THE PAGE HAS MORE DOTS THAN THE PICTURE AT THE TOP?

WHICH PICTURE BELOW HAS MORE DOTS THAN THE PICTURE AT THE TOP?

MARK THE PICTURE THAT HAS MORE DOTS THAN THE PICTURE AT THE TOP. (Pause)







NOW, TURN TO THE NEXT PAGE.

LOOK AT THE NUMBERS AT THE TOP OF THE PAGE. SEE THE NUMBERS AT THE TOP?

WHICH MEANS THE GREATEST NUMBER OF THINGS?

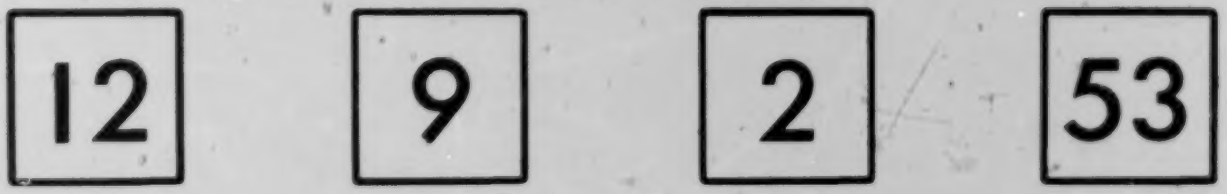
MARK THE NUMBER THAT MEANS THE GREATEST NUMBER OF THINGS (Pause).

17

LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE.

WHICH MEANS THE LEAST NUMBER OF THINGS?

MARK THE NUMBER THAT MEANS THE LEAST NUMBER OF THINGS. (Pause)



NOW, TURN TO THE NEXT PAGE.

LOOK AT THE NUMBERS IN THE BOXES.

WHICH ONE HAS A FIVE IN THE TENS PLACE?

WHICH NUMBER HAS A FIVE IN THE TENS PLACE?

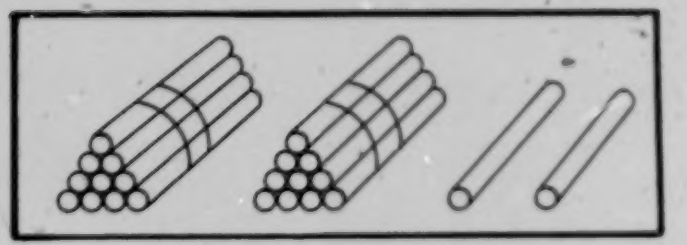
MARK THE NUMBER THAT HAS A FIVE IN THE TENS PLACE. (Pause)

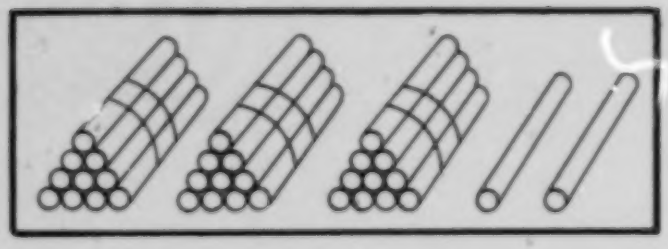
NOW, TURN TO THE NEXT PAGE.

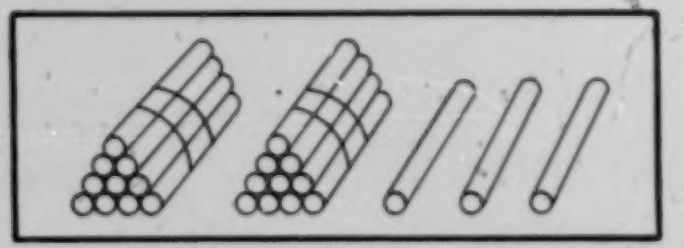
LOOK AT THE PICTURES.

WHICH PICTURE SHOWS **32** ?

MARK THE PICTURE THAT SHOWS 32. . (Pause)







NOW, TURN TO THE NEXT PAGE.

THIS TIME YOU ARE TO WRITE A NUMBER IN THE BOX. WHICH NUMBER TELLS HOW MANY TENS ARE IN TWENTY-EIGHT?

28

WHICH NUMBER TELLS HOW MANY TENS?

WRITE THE NUMBER THAT TELLS HOW MANY TENS. (Pause)

NOW, TURN TO THE NEXT PAGE.

LOOK AT THE NUMBERS AT THE TOP OF THE PAGE. SEE THE NUMBERS AT THE TOP?

WHICH NUMBER MEANS FIVE TENS AND TWO ONES?

MARK THE NUMBER THAT MEANS FIVE TENS AND TWO ONES. (Pause)

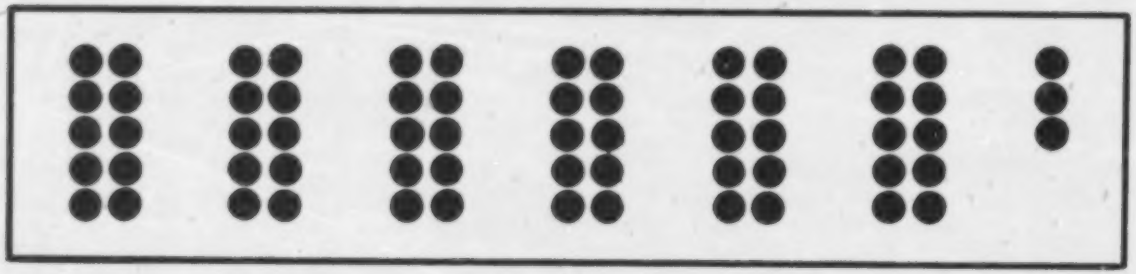
NOW LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE. SEE THE NUMBERS AT THE BOTTOM?

WHICH NUMBER MEANS ONE TEN AND THREE ONES?

MARK THE NUMBER THAT MEANS ONE TEN AND THREE ONES. (Pause)

NOW, TURN TO THE NEXT PAGE.

LOOK AT THE PICTURE AT THE TOP OF THE PAGE. SEE THE PICTURE AT THE TOP?



22

HOW MANY DOTS ARE IN THE PICTURE?

MARK THE NUMBER AT THE BOTTOM THAT TELLS HOW MANY DOTS.

(Pause, but not long enough for the children to count all the dots.)

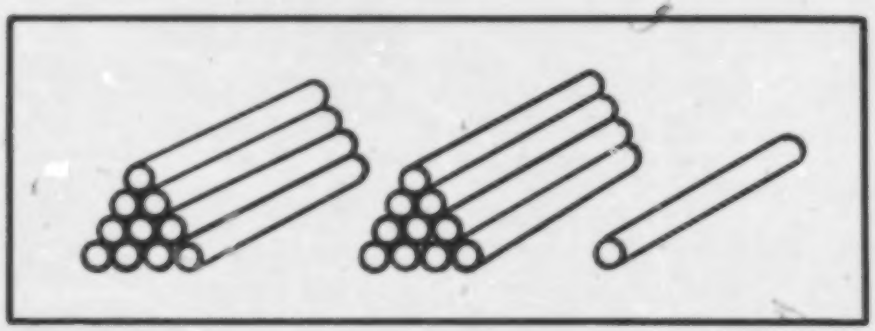
MARK THE NUMBER THAT TELLS HOW MANY DOTS ARE IN THE PICTURE.

7	36	63	70

43

NOW, TURN TO THE NEXT PAGE.

THIS TIME YOU ARE TO WRITE A NUMBER IN THE BOX.

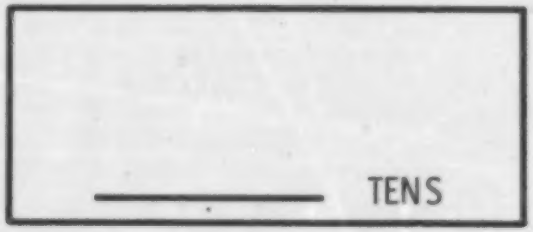


LOOK AT THE PICTURE. HOW MANY GROUPS OF TEN ARE THERE?

23

LOOK AT THE PICTURE. HOW MANY TENS ARE THERE?

WRITE THE NUMBER THAT TELLS HOW MANY TENS. (Pause)



NOW, TURN TO THE NEXT PAGE.

THIS TIME AGAIN, YOU ARE TO WRITE A NUMBER IN THE BOX. LOOK AT THE THIRTY-SEVEN.

37

WHICH NUMBER IS IN THE ONES PLACE?

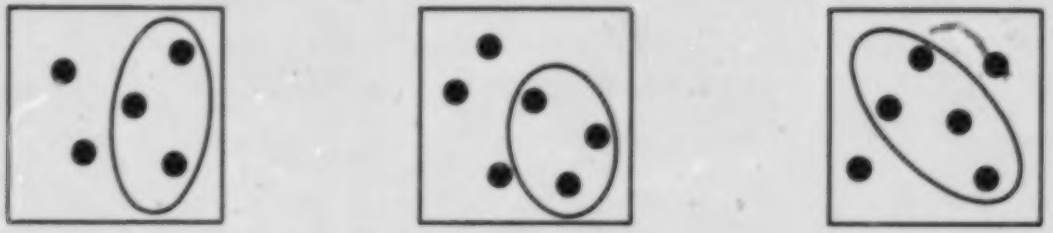
WRITE THE NUMBER THAT TELLS HOW MANY ONES. (Pause)

NOW, TURN TO THE NEXT PAGE.

LOOK AT THE PICTURES AT THE TOP OF THE PAGE. 14-16,17

WHICH PICTURE SHOWS FIVE MINUS THREE EQUALS TWO? (Pause)

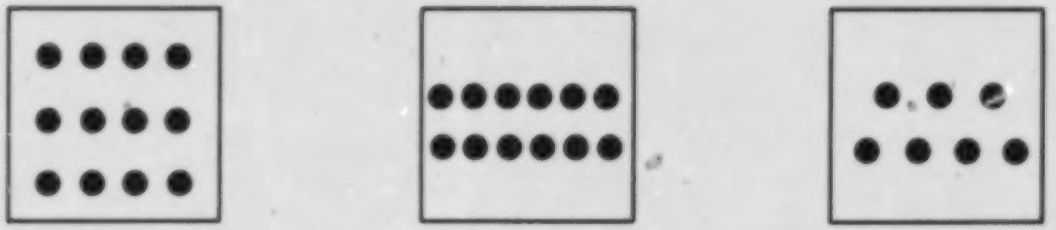
MARK THE PICTURE THAT SHOWS FIVE TAKE AWAY THREE EQUALS TWO.



NOW LOOK AT THE PICTURES AT THE BOTTOM OF THE PAGE. (Pause)

WHICH PICTURE SHOWS THREE TIMES FOUR? (Pause)

MARK THE PICTURE THAT SHOWS THREE TIMES FOUR.



NOW, TURN TO THE NEXT PAGE.

LISTEN TO THE STORY. THEN MARK THE NUMBER THAT ANSWERS THE QUESTION. LISTEN CAREFULLY.

TOM AND JIM SHARE A BAG OF MARBLES. ONE DAY TOM TAKES TWENTY-FIVE OF THE MARBLES TO SCHOOL AND JIM TAKES THE OTHER SEVENTEEN. THE NEXT DAY TOM TAKES SEVENTEEN MARBLES. HOW MANY MARBLES ARE THERE FOR JIM TO TAKE? (Pause)

TOM AND JIM SHARE A BAG OF MARBLES. ONE DAY TOM TAKES TWENTY-FIVE OF THE MARBLES TO SCHOOL AND JIM TAKES THE OTHER SEVENTEEN. THE NEXT DAY TOM TAKES SEVENTEEN MARBLES. HOW MANY MARBLES ARE THERE FOR JIM TO TAKE? MARK THE NUMBER THAT TELLS HOW MANY MARBLES THERE ARE FOR JIM TO TAKE.

17	42	25	8

NOW, TURN TO THE NEXT PAGE.

LOOK AT THE NUMBERS AT THE TOP OF THE PAGE. LISTEN CAREFULLY TO THE STORY.

SUE HAD ONE CRAYON. MARY GAVE HER TWO MORE CRAYONS. HOW MANY CRAYONS DOES SUE HAVE NOW? (pause)

SUE HAD ONE CRAYON. MARY GAVE HER TWO MORE CRAYONS. HOW MANY CRAYONS DOES SUE HAVE NOW? MARK THE NUMBER THAT TELLS HOW MANY CRAYONS SUE HAS NOW.

NOW LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE. LISTEN CAREFULLY TO THE STORY.

MARY HAD SOME MONEY. SHE SPENT THREE CENTS FOR CANDY AND ONE CENT FOR A GUM BALL. THEN HER MONEY WAS ALL GONE. HOW MUCH MONEY DID MARY HAVE BEFORE SHE SPENT ANY? (pause)

MARY HAD SOME MONEY. SHE SPENT THREE PENNIES FOR CANDY AND ONE PENNY FOR A GUM BALL. THEN HER MONEY WAS ALL GONE. HOW MANY PENNIES DID MARY HAVE BEFORE SHE SPENT ANY? MARK THE NUMBER THAT TELLS HOW MANY PENNIES MARY HAD BEFORE SHE SPENT ANY.

NOW, TURN TO THE NEXT PAGE.

LOOK AT THE NUMBERS AT THE TOP OF THE PAGE. HERE IS THE STORY.

PATTI HAS THREE COOKIES. IF SHE EATS ONE OF THEM, HOW MANY COOKIES WILL SHE HAVE LEFT? (pause)

PATTIE HAS THREE COOKIES. IF SHE EATS ONE OF THEM, HOW MANY COOKIES WILL SHE HAVE LEFT? MARK THE NUMBER THAT TELLS HOW MANY COOKIES ARE LEFT.

1	2	3	4

LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE. NOW LISTEN TO THE STORY.

TONY HAD SOME BLOCKS. DAVID GAVE HIM FOUR MORE BLOCKS. NOW TONY HAS SEVEN BLOCKS. HOW MANY BLOCKS DID TONY HAVE BEFORE DAVID GAVE HIM MORE? (pause)

TONY HAD SOME BLOCKS. DAVID GAVE HIM FOUR MORE BLOCKS. NOW TONY HAS SEVEN BLOCKS. HOW MANY BLOCKS DID TONY HAVE BEFORE DAVID GAVE HIM MORE? MARK THE NUMBER THAT TELLS HOW MANY BLOCKS TONY HAD BEFORE DAVID GAVE HIM MORE.

3	4	5	6

NOW, TURN TO THE NEXT PAGE.

LOOK AT THE NUMBERS AT THE TOP OF THE PAGE. NOW LISTEN TO THE STORY.

JOHN HAD SOME PENNIES. HE LOST THREE OF THEM. NOW HE HAS FOUR PENNIES. HOW MANY PENNIES DID JOHN HAVE BEFORE HE LOST ANY? (pause)

JOHN HAD SOME PENNIES. HE LOST THREE OF THEM. NOW HE HAS FOUR PENNIES. HOW MANY PENNIES DID JOHN HAVE BEFORE HE LOST ANY? MARK THE NUMBER THAT TELLS HOW MANY PENNIES JOHN HAD BEFORE HE LOST ANY.

3	5	7	4

LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE. NOW LISTEN TO THE STORY.

BILL HAS FIVE PENCILS. JOHN HAS THREE PENCILS. HOW MANY MORE PENCILS DOES BILL HAVE THAN JOHN? (pause)

BILL HAS FIVE PENCILS. JOHN HAS THREE PENCILS. BILL HAS MORE PENCILS THAN JOHN. HOW MANY MORE PENCILS DOES BILL HAVE THAN JOHN? MARK THE NUMBER THAT TELLS HOW MANY MORE PENCILS BILL HAS THAN JOHN.

1	3	5	2

NOW, TURN TO THE NEXT PAGE.

LISTEN CAREFULLY TO THE STORY.

MRS. JONES BOUGHT SIX EGGS. SHE USED ONE HALF THE EGGS TO MAKE A CAKE. HOW MANY EGGS DID SHE USE?

MRS. JONES BOUGHT SIX EGGS. SHE USED ONE HALF THE EGGS TO MAKE A CAKE. HOW MANY EGGS DID SHE USE? MARK THE NUMBER THAT TELLS HOW MANY EGGS MRS. JONES USED.

30

2	3	4

NOW, TURN TO THE NEXT PAGE.

LOOK AT THE NUMBERS AND LISTEN TO THE QUESTION.

WHEN SOMETHING IS CUT IN FOURTHS, HOW MANY PIECES ARE THERE? (Pause)

WHEN SOMETHING IS CUT IN FOURTHS, HOW MANY PIECES ARE THERE?

MARK THE NUMBER THAT TELLS HOW MANY PIECES.

2	3	4	5

31

Instructions for the remainder of Form 2-01 are to be read after the first twenty-six items (pages 1-20) have been completed:

YOU ARE GOING TO WORK THE REST OF THE BOOKLET BY YOURSELVES. YOU ARE TO WRITE THE MISSING NUMBER FOR EACH EXAMPLE. FINISH ALL THE EXAMPLES YOU KNOW HOW TO DO. IF YOU NEED THINGS TO COUNT, USE YOUR FINGERS OR MAKE MARKS ON THE PAGE. WHEN YOU HAVE FINISHED ONE PAGE GO ON TO THE NEXT PAGE UNTIL YOU HAVE COMPLETED THE BOOKLET.

THERE ARE SOME EXAMPLES THAT YOU MAY NOT HAVE HAD. IF YOU COME TO EXAMPLES YOU DON'T KNOW HOW TO DO, GO ON TO THE NEXT PAGE. WORK CAREFULLY AND COMPLETE ALL EXAMPLES YOU KNOW HOW TO DO. ARE THERE ANY QUESTIONS?

(If there are questions, repeat any of the above instructions appropriate to the questions.)

REMEMBER, TAKE YOUR TIME AND COMPLETE ALL EXAMPLES YOU KNOW HOW TO DO. TURN TO THE NEXT PAGE IN YOUR BOOKLET. YOU MAY BEGIN.

In order to keep the children who may finish early from disturbing those who are still working, we have provided dot-to-dot activity pages. These should be placed in an accessible spot in the examination room. When a child has finished his answer booklet, and you have checked to see that he has completed it, he may be allowed to take one of the dot-to-dot activity pages to work on while the slower children are finishing their tests. The children may keep these pages, and the slower children should be given one to take home when the testing has been completed.

SCHOOL
MATHEMATICS
STUDY GROUP

Grade 2
Fall

FORM 2-01

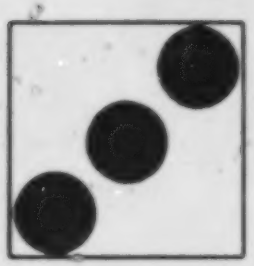
33

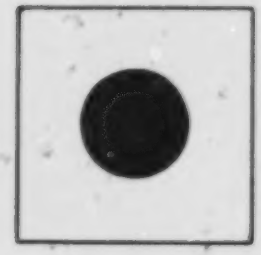
Name of tester _____

Cedar Hall, Stanford University
Stanford, California

Form 2-01

WHICH PICTURE HAS THREE DOTS?





34

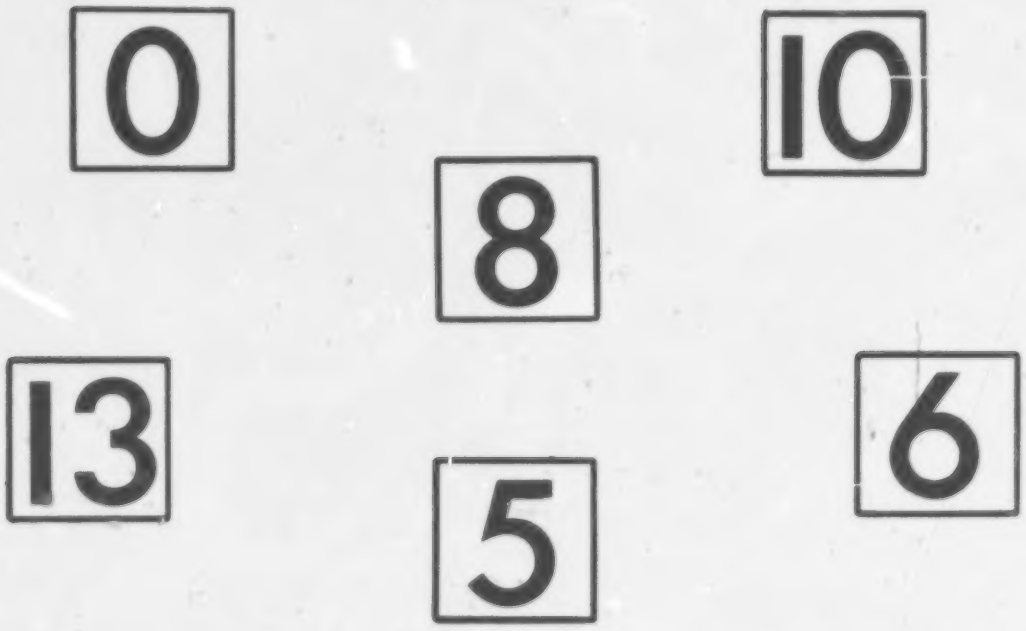
WHAT NUMBER COMES AFTER FOUR?

3	4	5

67

2-1

WHICH NUMBER IS LARGEST?



3-2

36

WHICH PICTURE BELOW HAS FEWER DOTS THAN THE PICTURE AT THE TOP?

71

(3)

WHICH NUMBER IS BETWEEN EIGHT AND FIVE?

3 5 7

(4)

WHICH NUMBER IS BETWEEN FOUR AND SEVEN?

8 6 3

WHICH PICTURE BELOW HAS MORE DOTS THAN THE PICTURE AT THE TOP?

6-6,7

(6)

WHICH MEANS THE GREATEST NUMBER OF THINGS?

38 29 5 0

39

(7)

WHICH MEANS THE LEAST NUMBER OF THINGS?

12 9 2 53

WHICH NUMBER HAS A FIVE IN THE TENS PLACE?

15

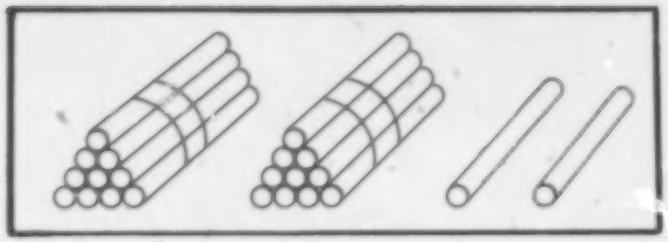
5

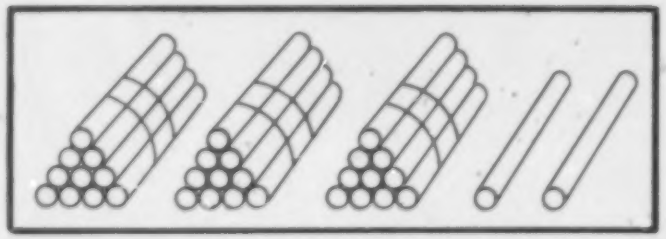
51

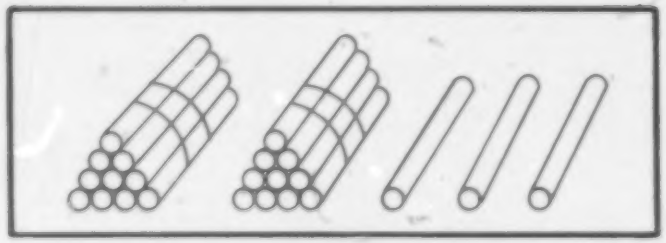
Grade 2
Fall

8-9

WHICH PICTURE SHOWS **32** ?







Form 2-01
Item 9.

81

82

9-10

28

WHICH NUMBER TELLS HOW MANY TENS?

10-11,12

(11)

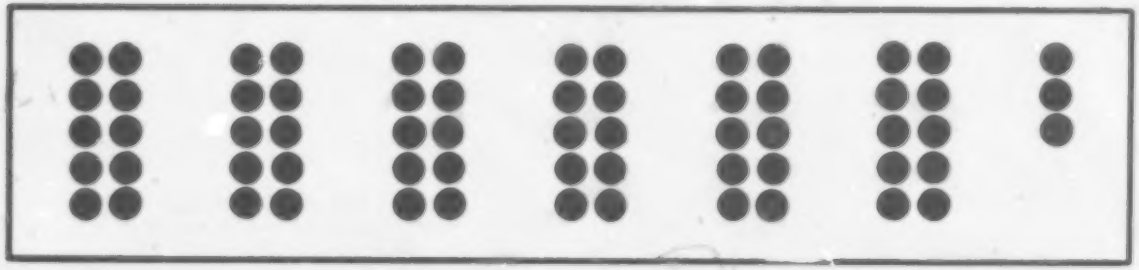
WHICH NUMBER MEANS FIVE TENS AND TWO ONES?

52	25	7

(12)

WHICH NUMBER MEANS ONE TEN AND THREE ONES?

4	13	31



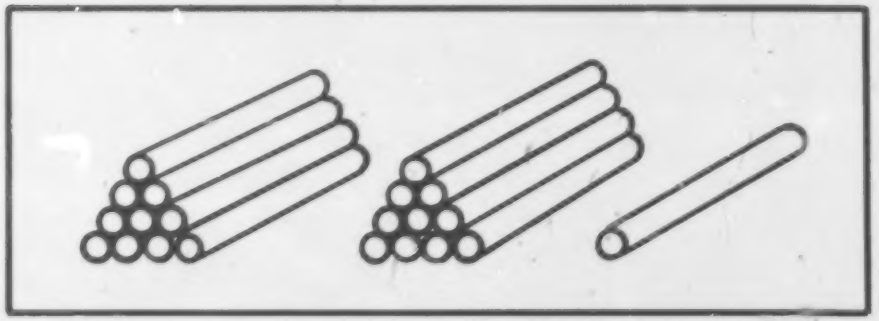
HOW MANY DOTS ARE IN THE PICTURE?

7

36

63

70



LOOK AT THE PICTURE. HOW MANY TENS ARE THERE?

_____ TENS

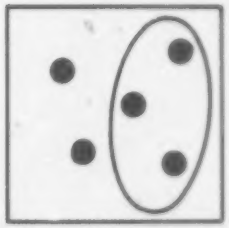
37

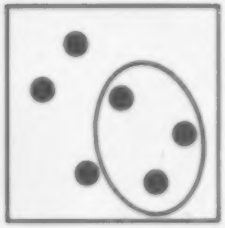
WHICH NUMBER IS IN THE ONES PLACE?

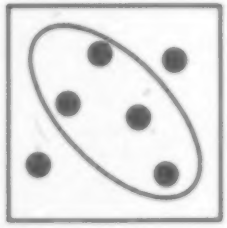
14-16,17

(16)

WHICH PICTURE SHOWS FIVE MINUS THREE EQUALS TWO?



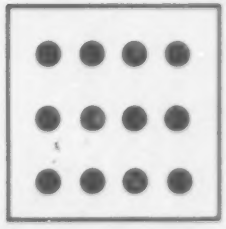


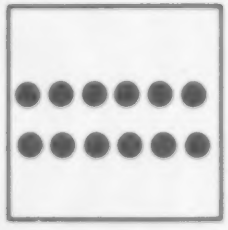


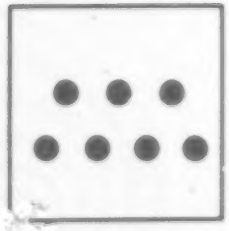
47

(17)

WHICH PICTURE SHOWS THREE TIMES FOUR?







94

TOM AND JIM SHARE A BAG OF MARBLES. ONE DAY TOM TAKES TWENTY-FIVE OF THE MARBLES TO SCHOOL AND JIM TAKES THE OTHER SEVENTEEN. THE NEXT DAY TOM TAKES SEVENTEEN MARBLES. HOW MANY MARBLES ARE THERE FOR JIM TO TAKE?

48

17

42

25

8

(19)

SUE HAD ONE CRAYON. MARY GAVE HER TWO MORE CRAYONS. HOW MANY CRAYONS DOES SUE HAVE NOW?

1	2	3	4

49

(20)

MARY HAD SOME MONEY. SHE SPENT THREE CENTS FOR CANDY AND ONE CENT FOR A GUM BALL. THEN HER MONEY WAS ALL GONE. HOW MUCH MONEY DID MARY HAVE BEFORE SHE SPENT ANY?

1	2	3	4

(21)

17-21,22

PATTI HAS THREE COOKIES. IF SHE EATS ONE OF THEM, HOW MANY COOKIES WILL SHE HAVE LEFT?

1 2 3 4

50

(22)

TONY HAD SOME BLOCKS. DAVID GAVE HIM FOUR MORE BLOCKS. NOW TONY HAS SEVEN BLOCKS. HOW MANY BLOCKS DID TONY HAVE BEFORE DAVID GAVE HIM MORE?

3 4 5 6

99

(23)

JOHN HAD SOME PENNIES. HE LOST THREE OF THEM. NOW HE HAS FOUR PENNIES. HOW MANY PENNIES DID JOHN HAVE BEFORE HE LOST ANY?

3 5 7 4

(24)

BILL HAS FIVE PENCILS. JOHN HAS THREE PENCILS. HOW MANY MORE PENCILS DOES BILL HAVE THAN JOHN?

1 3 5 2

19-25

MRS. JONES BOUGHT SIX EGGS. SHE USED ONE HALF THE EGGS TO MAKE A CAKE. HOW MANY EGGS DID SHE USE?

52

2

3

4

103

104

20-26

WHEN SOMETHING IS CUT IN FOURTHS, HOW MANY PIECES ARE THERE?

53

2	3	4	5

(27)

$3+3=\square$

(28)

$4+1=\square$

54

COMPLETE THE EQUATIONS.

(29)

$0+9=\square$

(30)

$2+5=\square$

(31)

$1+7=\square$

(32)

$6+4=\square$

55

COMPLETE THE EQUATIONS.

(33)

$9+2=\square$

(34)

$7+7=\square$

(35)

FIND THE SUMS.

$$50 + 40 = \square$$

(36)

$$\begin{array}{r} 42 \\ +\,23 \\ \hline \end{array}$$

GRADE 2

WINTER TEST BATTERY

FORM 2-02

INTRODUCTION

Grade 2 - Winter Testing

Form 2-02

The scales administered during February and March of Grade 2 were designed to measure student attitudes. They were administered to all participating students in the test center which had all four cells (low income-SMSG, low income-SRA, middle income-SMSG, and middle income-SRA).

The attitude inventory was administered to small groups of five or six students at a time. The items were printed in booklets, although each item was still read by the tester as well as being printed in the booklet. The testers attended a training session before testing began in which the manner of administering the battery was demonstrated.

The test has been reproduced exactly as it was given with one exception. In the original Form 2-02 booklets, the items were printed only on the right-hand page, leaving the left page blank. In this report, Form 2-02 is printed on both pages.

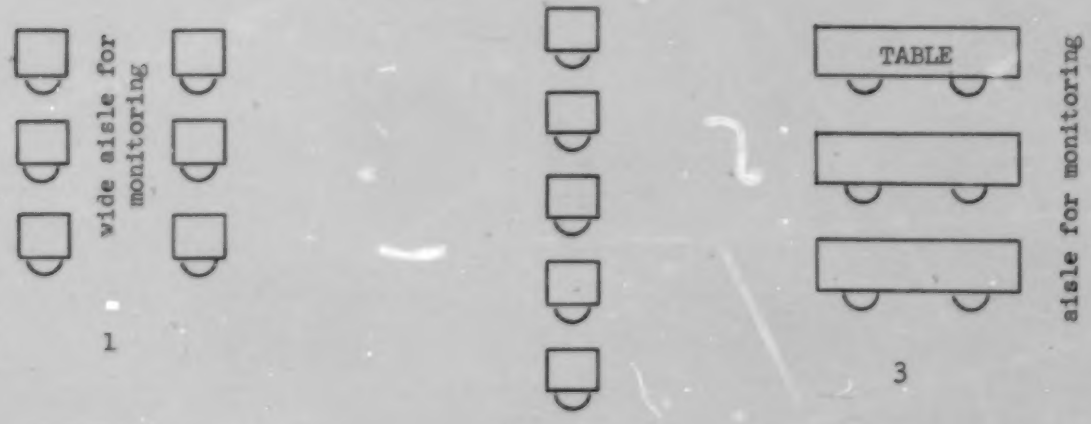
SCHOOL MATHEMATICS STUDY GROUP
ELEMENTARY MATHEMATICS PROJECT

FEB.-MAR. INVENTORY 1969 - GRADE 2

DIRECTIONS FOR GROUP ATTITUDE TEST: FORM 2-02

1. Setting for Administration of Tests

You will need a separate room. Seating arrangements for the test are especially important for several reasons: first, to eliminate all possibilities for copying; second, to minimize one child's distracting another; and third, to permit you more easily to monitor all of the children in the group. You will need five (or six) separate desks at which the children may work. The two more desirable arrangements are to place desks in two rows with a wide aisle separating the rows, or in a single row with one desk behind the other. (See first two illustrations.) If separate desks are not available, one alternative is to carefully space children at several long tables, as shown in illustration 3.



Since we cannot foresee all possible problems in physical arrangements, we will rely on your ingenuity to make certain that each child's responses are independently arrived at.

2. Materials

Tester directions for administering Form 2-02
Alpha-by-school roster
Pupil answer booklets
Pencils

3. Procedure

It is assumed that you will have read over the instructions for administering the test several times prior to beginning testing so that you are familiar with both the items and directions.

In general, administer this test to five children in a group. However, in no instance give the test to a group larger than six. In selecting the group of five children for testing, try to minimize disruption of classroom activity. In all instances comply with the teacher's wishes in selecting the set of children to be taken each time for the group testing.

The atmosphere should be as anxiety-free as possible. Set the tone by talking to the children as they enter the examination room and being seated at prearranged desks.

4. Test Administration

You will be at the front of the rows of desks when you read the test directions to the children. Make certain you have the children's attention when you give directions and point to pictures on the test booklet pages. If there is room, have a small desk or table near you upon which to place your testing directions. What you will be holding up for demonstration is a copy of the pupil booklet that the children have before them.

Children are not to turn the page until you tell them to do so. Watch to be sure that all of the children are on the page corresponding to the one that is to be read.

You will need to monitor the children by walking up and down the aisle periodically to check that each child is on the right page and is marking only one response to each item.

Discourage the children from giving their responses out loud. If a child talks during the testing, remind him reassuringly that he is not to talk, that you will know which answer was right for him when you look at his booklet.

The first page of test booklet Form 2-02 contains a sample item. It is to be used by the tester to explain the test items and familiarize the children with the format. Because of previous individualized testing and other reasons, the children may be predisposed to oral responses. The tester should use the sample page to stress firmly but gently that children are to mark their responses on the page rather than "tell" them. Additionally, the tester should stress that people feel differently about things, that they don't always like the same things.

If a child wants to change his response, make sure he has erased the original response before marking another.

You may repeat the directions on any item if the children do not seem to understand or have questions.

Before opening test booklets, the tester is to have about a one minute dialogue with children to explain what the test is about. The main point of the dialogue is to convey the idea that people have different likes and dislikes.

> "CHILDREN LIKE LOTS OF DIFFERENT KINDS OF THINGS. SOME CHILDREN LIKE TO PLAY QUIET GAMES. OTHER CHILDREN DON'T. SOME CHILDREN LIKE TO EAT LOTS OF VEGETABLES, WHILE OTHER CHILDREN LIKE TO EAT LOTS OF MEAT. PEOPLE LIKE DIFFERENT THINGS.

TODAY I'M GOING TO ASK YOU SOME QUESTIONS ABOUT WHAT YOU LIKE AND HOW YOU FEEL ABOUT SOME THINGS AT SCHOOL. YOUR ANSWER TO A QUESTION MAY BE QUITE DIFFERENT FROM SOMEONE ELSE'S ANSWER, BUT THAT ONLY MEANS THAT THE TWO OF YOU FEEL DIFFERENT, AND ALL ANSWERS ARE CORRECT IF EACH CHILD IS EXPRESSING HOW HE FEELS. THE RIGHT ANSWER IS HOW YOU FEEL. THERE ARE NO WRONG ANSWERS.

LISTEN CAREFULLY TO THE QUESTIONS AS I READ THEM, THEN MAKE AN 'X' ON THE ANSWER THAT TELLS HOW YOU FEEL. PLEASE DON'T TALK. I WILL KNOW HOW YOU FEEL WHEN I SEE THE ANSWER YOU HAVE MARKED."

OPEN YOUR BOOKLETS AND LOOK THIS WAY. (Make sure each child opens booklet to the sample page entitled "These Children are Thinking about Recess," and is looking toward you before continuing. Hold your booklet in front of you so that it is visible to each child.)

THESE CHILDREN ARE THINKING ABOUT RECESS. (Point to the picture on the children's left.)

PUT YOUR FINGER ON THE FIRST PICTURE. (Read the text under this picture. Point to the next picture.)

NOW, PUT YOUR FINGER ON THE NEXT PICTURE. (Read the text under this picture. Pause. Read the sentence at the bottom of the page. Make sure each child understands what he is to do and makes his response before continuing.)

DO YOU UNDERSTAND WHAT YOU ARE TO DO? (Use this page to clarify any questions the children may have.)

TURN TO THE NEXT PAGE AND LOOK THIS WAY.
(Turn to page 1.)

Page 1. THESE CHILDREN ARE DOING MATH PROBLEMS AT THE CHALKBOARD. (Point to the picture of the child on the children's left.)

PUT YOUR FINGER ON THE FIRST CHILD. (Make sure each child is pointing to the picture of the first child at the chalkboard and not the picture of the teacher. Read the text written under this picture.)

NOW, POINT TO THE NEXT CHILD. (Read the text under this picture. Pause.)

MARK THE CHILD THAT IS MOST LIKE YOU WHEN YOU DO MATH PROBLEMS. (Pause for children to make their responses.)

TURN TO THE NEXT PAGE, AND LOOK THIS WAY. (Turn to page 2.)

Page 2. THESE CHILDREN ARE DOING MATH WORKSHEETS. (Point to picture on children's left.)

POINT TO THE FIRST CHILD. (Read the text under this picture.)

NOW, POINT TO THE NEXT CHILD. (Read the text under this picture.)

MARK THE CHILD THAT IS MOST LIKE YOU WHEN YOU DO MATH WORKSHEETS. (Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 3.)

Page 3. THESE CHILDREN ARE DOING MATH WORKSHEETS. (Point to the picture on the children's left.)

POINT TO THE FIRST CHILD. (Read the text under picture.)

POINT TO THE NEXT CHILD. (Read the text under the picture.)

MARK THE CHILD THAT IS MOST LIKE YOU WHEN YOU DO MATH PROBLEMS. (Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 4.)

Note: By this time, the children are familiar with the format and may no longer need to watch you point to the pictures; however, children should continue to point to the pictures as you read the corresponding text.

Page 4. THESE CHILDREN ARE DOING ARITHMETIC.
POINT TO THE FIRST CHILD. (Read text.)
POINT TO THE NEXT CHILD. (Read text.)
MARK THE CHILD THAT IS MOST LIKE YOU IN WORKING AT ARITHMETIC.
(Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 5.)

Page 5. THESE CHILDREN HAVE FINISHED THEIR WORK AND HAVE FREE TIME.
POINT TO THE FIRST CHILD. (Read text.)
POINT TO THE NEXT CHILD. (Read text.)
MARK THE CHILD THAT IS MOST LIKE YOU WHEN YOU HAVE FREE TIME.
(Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 6.)

Page 6. THIS TIME THERE ARE THREE PICTURES. POINT TO THE FIRST PICTURE.
(Make sure each child is pointing to the corresponding pictures as you read the text under each one. Read the text under the first picture.)

NOW POINT TO THE MIDDLE PICTURE. (Read text.)
POINT TO THE LAST PICTURE. (Read text.)
MARK THE CHILD THAT IS MORE LIKE YOU. (Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 7.)

Page 7. POINT TO THE FIRST PICTURE. (Read text.)
POINT TO THE MIDDLE PICTURE. (Read text.)
POINT TO THE LAST PICTURE. (Read text.)
MARK THE CHILD THAT IS MORE LIKE YOU. (Pause for responses.)
TURN TO THE NEXT PAGE. (Turn to page 8.)

Page 8. POINT TO THE FIRST PICTURE. (Read text.)
POINT TO THE MIDDLE PICTURE. (Read text.)
POINT TO THE LAST PICTURE. (Read text.)
MARK THE CHILD THAT IS MORE LIKE YOU. (Pause for responses.)
TURN TO THE NEXT PAGE. (Turn to page 9.)

Page 9. POINT TO THE FIRST PICTURE. (Read text.)
POINT TO THE MIDDLE PICTURE. (Read text.)
POINT TO THE LAST PICTURE. (Read text.)
MARK THE CHILD THAT IS MORE LIKE YOU. (Pause for responses.)
TURN TO THE NEXT PAGE. (Turn to page 10.)

Page 10. POINT TO THE FIRST PICTURE. (Read text.)
POINT TO THE MIDDLE PICTURE. (Read text.)
POINT TO THE LAST PICTURE. (Read text.)
MARK THE CHILD THAT IS MORE LIKE YOU. (Pause for responses.)
TURN TO THE NEXT PAGE. (Turn to page 11.)

Page 11. POINT TO THE FIRST PICTURE. (Read text.)
POINT TO THE MIDDLE PICTURE. (Read text.)
POINT TO THE LAST PICTURE. (Read text.)
MARK THE CHILD THAT IS MORE LIKE YOU. (Pause for responses.)
TURN TO THE NEXT PAGE. (Turn to page 12.)

Page 12. THIS TIME YOU ARE TO MARK THE FACE THAT SHOWS HOW YOU FEEL.
HOW DO YOU FEEL WHEN TEACHER SAYS:

"PUT AWAY YOUR ARITHMETIC BOOKS. BRING OUT YOUR STORY BOOKS."

(Pause)

MARK THE FACE THAT SHOWS HOW YOU FEEL. (Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 13.)

Page 13. HOW DO YOU FEEL WHEN TEACHER SAYS:

"THAT'S THE END OF OUR MUSIC LESSON. NOW WE WILL DO SOME SUBTRACTION PROBLEMS." (Pause)

MARK THE FACE THAT SHOWS HOW YOU FEEL. (Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 14.)

Page 14. HOW DO YOU FEEL WHEN TEACHER SAYS:

"THAT'S ALL THE ARITHMETIC FOR TODAY. NOW LET'S DO OUR SPELLING." (Pause)

MARK THE FACE THAT SHOWS HOW YOU FEEL. (Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 15.)

Page 15. HOW DO YOU FEEL WHEN TEACHER SAYS:

"STOP WORKING ON YOUR ARITHMETIC PROBLEMS. IT'S TIME FOR READING NOW." (Pause)

MARK THE FACE THAT SHOWS HOW YOU FEEL. (Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 16.)

Page 16. HOW DO YOU FEEL WHEN TEACHER SAYS:

"IT'S TIME TO DO ARITHMETIC." (Pause)

MARK THE FACE THAT SHOWS HOW YOU FEEL. (Pause for responses.)

TURN TO THE NEXT PAGE. (Turn to page 17.)

Page 17. HOW DO YOU FEEL WHEN TEACHER SAYS:

"IT IS TIME FOR READING." (Pause)

MARK THE FACE THAT SHOWS HOW YOU FEEL.

SCHOOL
MATHEMATICS
STUDY GROUP

Grade 2
Winter

FORM 2-02

69

Name of tester _____

Date test given _____

Cedar Hall, Stanford University
Stanford, California

Form 2-02

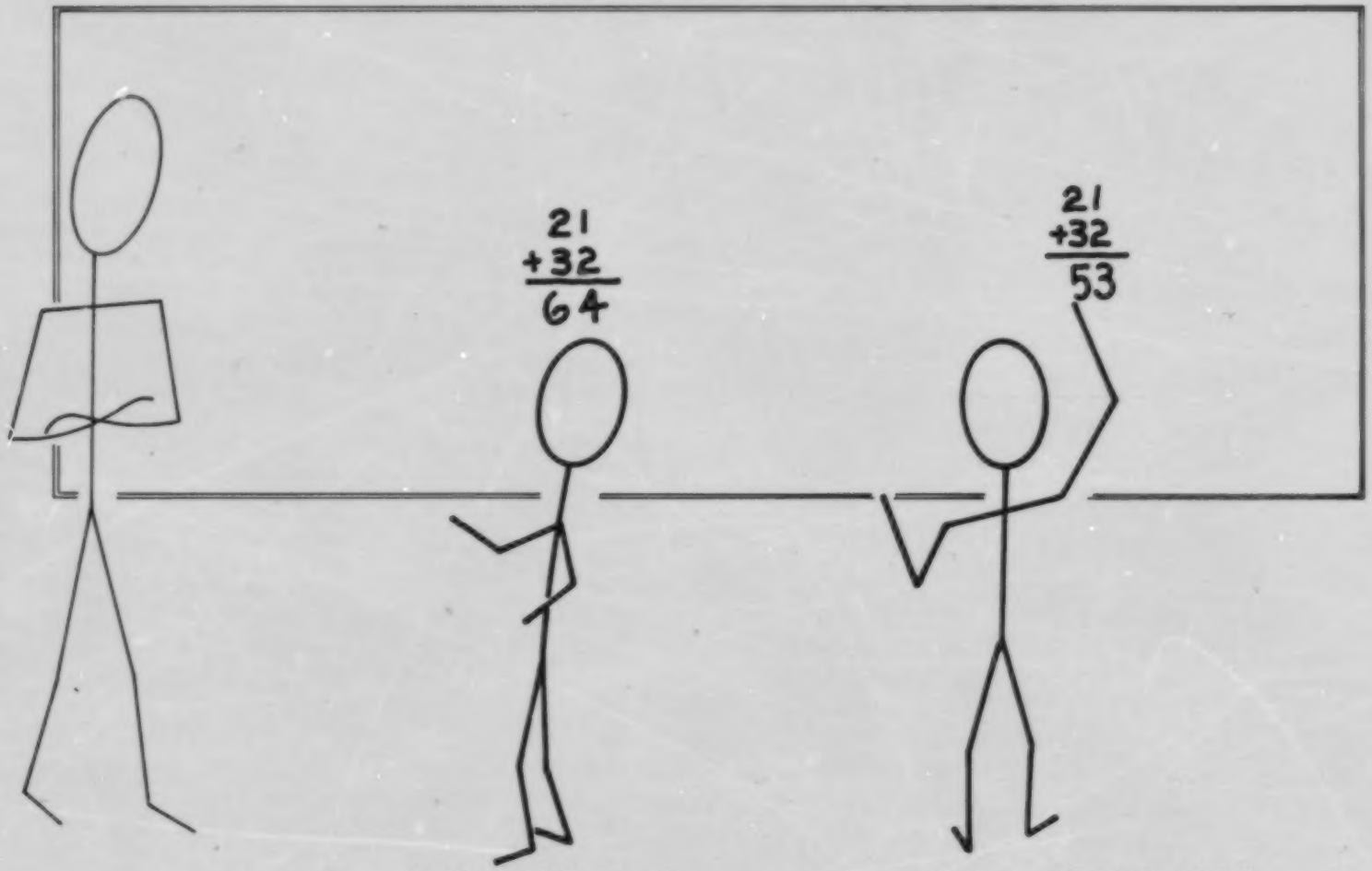
THESE CHILDREN ARE THINKING ABOUT RECESS.

Some children, like this child,
want to play on the swings.

Some children, like this child,
want to play ball.

Mark the child that is most like you.

THESE CHILDREN ARE DOING MATH PROBLEMS AT THE CHALKBOARD.

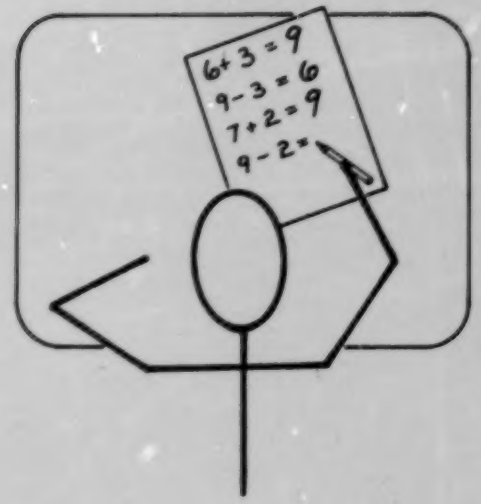


Some of the children, like this child, are having a hard time doing the problems.

Others, like this child, are having an easy time.

Mark the child that is most like you when you do math problems.

THESE CHILDREN ARE DOING MATH WORKSHEETS.

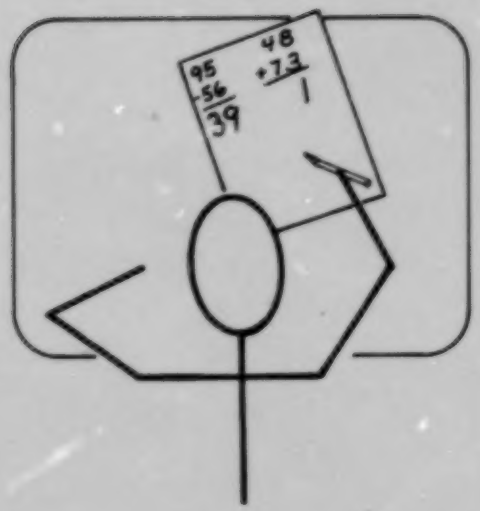


Some children, like this child, have an easy time working the equations.

Other children, like this child, have a harder time working the equations.

Mark the child that is most like you when you do math worksheets.

THESE CHILDREN ARE DOING MATH WORKSHEETS.

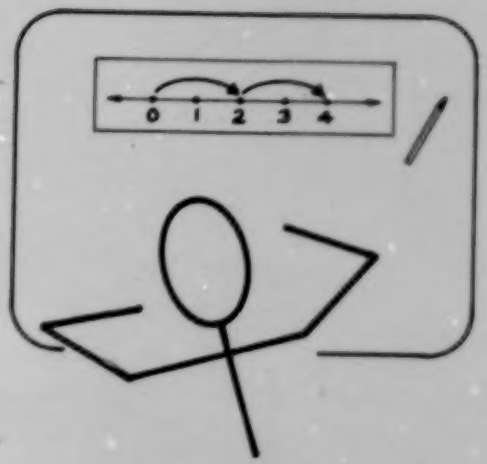


Some of the children, like this child, have an easy time doing the problems.

Some of the children, like this child, have a harder time doing the problems.

Mark the child that is most like you when you do math problems.

THESE CHILDREN ARE DOING ARITHMETIC.



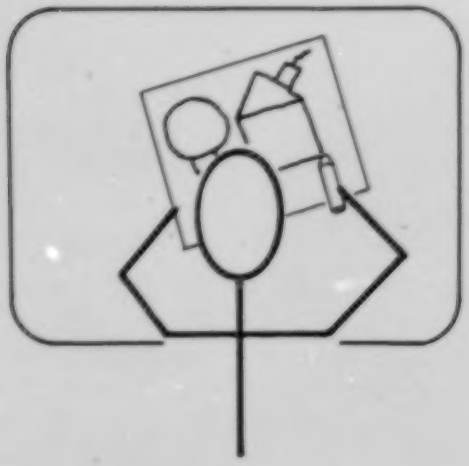
Some children, like this child, don't work very hard to do well in arithmetic.

Some children, like this child, work hard to do well in arithmetic.

Mark the child that is most like you in working at arithmetic.

THESE CHILDREN HAVE FINISHED THEIR WORK AND HAVE FREE TIME.

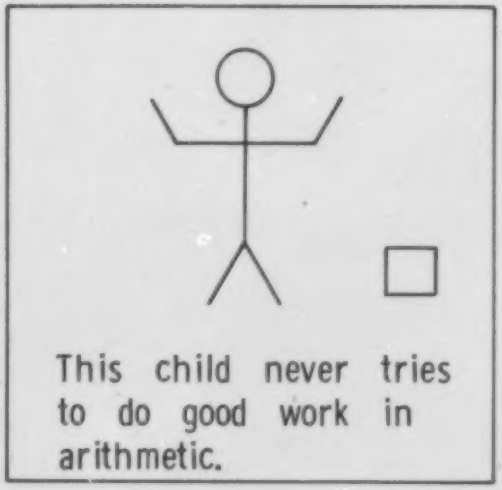
Some children, like this child, read a book when they have finished their work.



Some children, like this child, draw or color when they have finished their work.

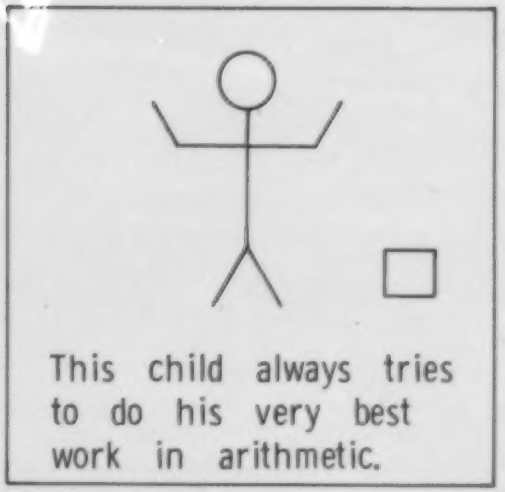
Mark the child that is most like you when you have free time.

WHICH CHILD IS MORE LIKE YOU?



This child never tries to do good work in arithmetic.

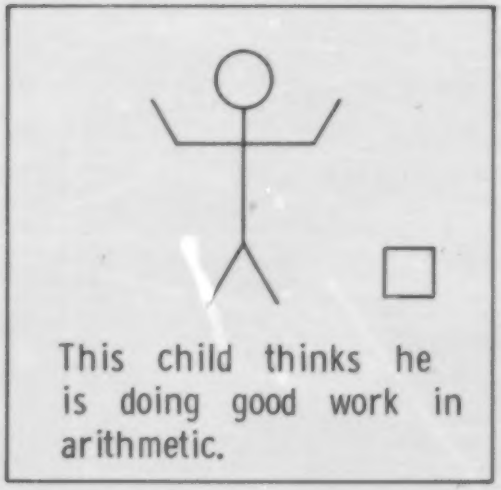
This child tries to do good work sometimes.



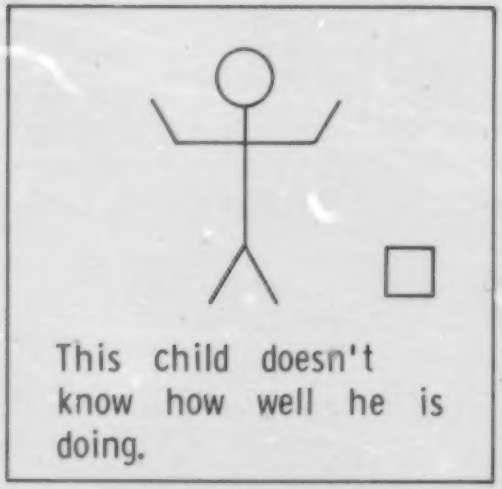
This child always tries to do his very best work in arithmetic.

WHICH CHILD IS MORE LIKE YOU?

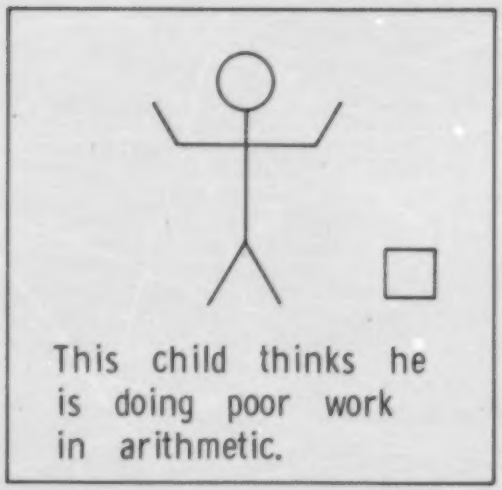
77



This child thinks he is doing good work in arithmetic.



This child doesn't know how well he is doing.



This child thinks he is doing poor work in arithmetic.

Grade 2
Winter
8

WHICH CHILD IS MORE LIKE YOU?

78

This child likes to be called on in arithmetic class.

This child doesn't care whether or not he is called on.

This child doesn't like to be called on in arithmetic class.

Form 2-02
Item 8

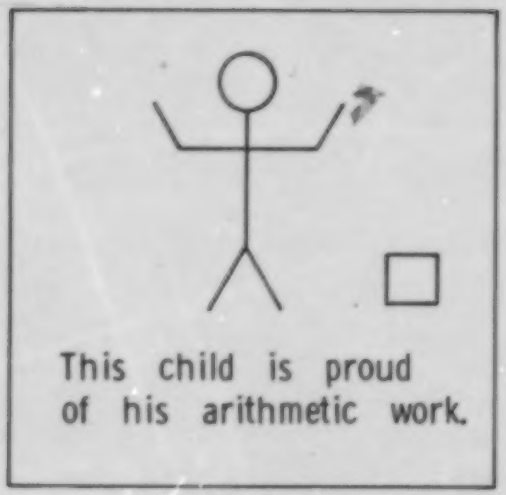
WHICH CHILD IS MORE LIKE YOU?

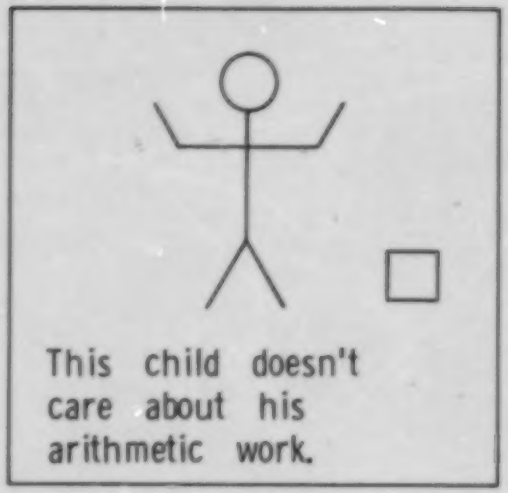
This child always feels upset during arithmetic class.

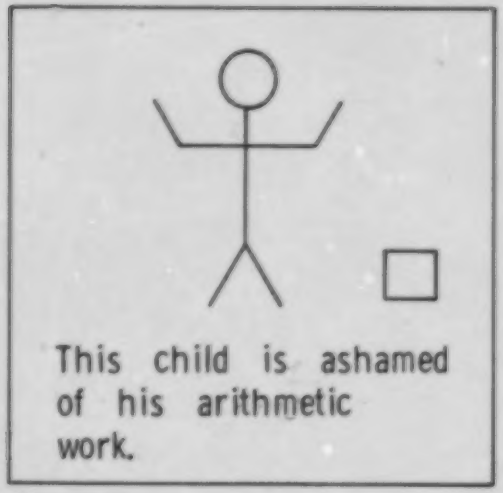
This child sometimes feels upset during arithmetic class.

This child never feels upset during arithmetic class.

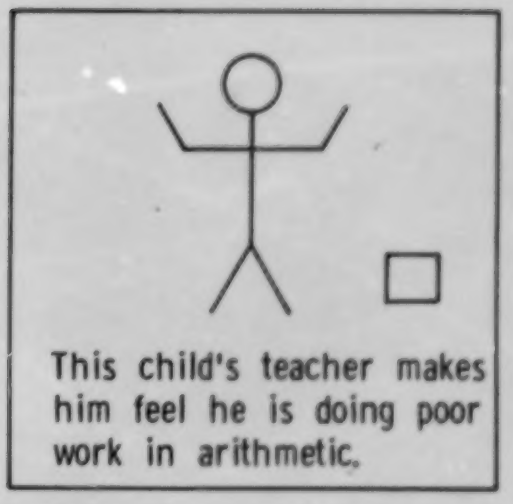
WHICH CHILD IS MORE LIKE YOU?

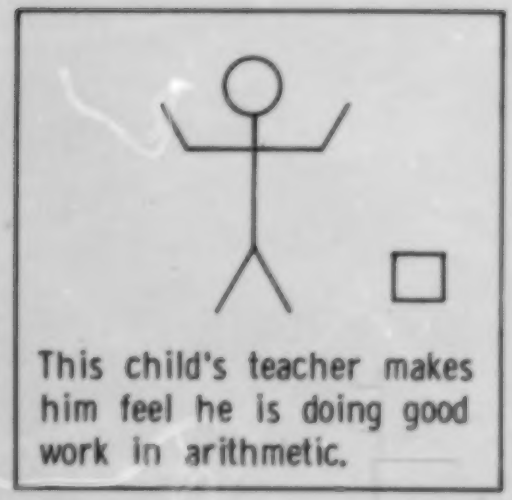






WHICH CHILD IS MORE LIKE YOU?





WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"Put away your arithmetic books.
Bring out your story books."

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"That's the end of our music lesson.
Now we will do some subtraction problems."

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"That's all the arithmetic for today.
Now let's do our spelling."

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"Stop working on your arithmetic problems.
It's time for reading now."

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"It is time to do arithmetic."

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"It is time for reading."

GRADE 2

SPRING TEST BATTERY

FORMS 2-03, 2-04, AND 2-05

INTRODUCTION

Grade 2 - Spring Testing

Forms 2-03, 2-04, and 2-05

All scales in the Grade 2 spring tests were designed to measure mathematics achievement. The battery was administered to the entire ELMA population in small groups of five or six students at a time. The tests were printed in booklets, although all items containing verbal information were still read by the tester as well as being printed in the booklets. The testers attended a training session before testing began in which the manner of administering the battery was demonstrated.

Forms 2-03 and 2-04 each took between thirty and forty-five minutes to administer, depending upon the group of children; Form 2-05 took somewhat less time. Because of the total length of the battery, each form was administered in a separate testing session, Forms 2-03 and 2-04 being given in April and Form 2-05 during the last two weeks in May.

The tests have been reproduced exactly as they were given with three exceptions. (1) Originally, the items in Form 2-05 were not numbered (although the item numbers did appear as part of the page number). For the reader's information, item numbers enclosed by parentheses have been added. (2) In the original 2-05 booklets, the items were printed only on the right-hand page, leaving the left page blank. In this report, Form 2-05 is printed on both pages. (3) Items 16 through 22 in Form 2-04 are not reproduced in this report. After the 2-04 booklets were printed and prior to the testing, it was decided that the items would be too difficult for the children. For this reason the items were omitted from the test administration.

SCHOOL MATHEMATICS STUDY GROUP

ELEMENTARY MATHEMATICS PROJECT

FORMS 2-03 and 2-04

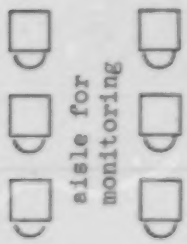
Spring Inventory, 1969 --- Grade 2

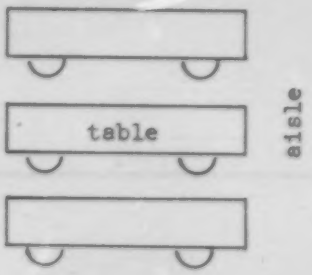
DIRECTIONS FOR ADMINISTERING FORMS 2-03 AND 2-04 TO SMALL GROUPS:

1. Setting for Administration of Tests

It is important to have a separate room so that interruptions and distractions are minimized.

Seating arrangements for the group test are especially important for several reasons: first, to eliminate possibilities for copying; second, to minimize one child's distracting another; and third, to permit you more easily to monitor all of the children in the group. You will need five (or six) separate desks at which the children may work. If separate desks are not available, one alternative is to carefully space children at several long tables. These diagrams show two possible arrangements:





If the room is small and the children must work at tables, place standing folders or boxes between them as barriers. Do not have the children facing each other across tables.

Since we cannot foresee all possible problems in physical arrangements, we will rely on your ingenuity to make certain that each child's responses are independently arrived at.

2. Procedure

In general, administer this test to five children in a group. If the number of children to be tested in a given school is, for example, 32, then you can administer the test to four groups of five children each and to two groups of six children. However, in no instance give the test to a group larger than six.

In selecting the group of five children for testing, try to minimize disruption of the classroom activity. In all instances comply with the teacher's wishes in selecting the set of children to be taken for the group testing. Don't keep children out of class any longer than is necessary.

Read over, several times, the instructions for administering the test to become familiar with the items and the directions before you start testing.

The atmosphere should be as anxiety-free as possible. Set the tone by talking to the children as they enter the examination room and are being seated at prearranged desks. If the children seem anxious, assure them that we are interested in what they are learning in school, but what they do will in no way affect their grades.

3. General Directions for Test Administration

The tester's manual includes all instructions that are to be read to the children. What you actually say to the child is typed in capital letters. The instructions for you, as tester, are typed in lower case. Read all the sentences (written in capital letters) to the children exactly as they are written. Keep the pupil booklet in front of you at all times as well as the tester's manual.

Directions are to be read slowly and distinctly as the tester circulates among the children. You will note that each instruction is read twice so that the tester is able to detect those children who do not understand. Allow several seconds after the final item instructions for the children to respond before going on to the next item. Make sure that all children are on the correct page before beginning instructions for that page.

Since the children's test booklets have items on facing pages, we want to eliminate their being distracted by two pages of items exposed simultaneously. Therefore, it will be necessary for you to help each child fold his booklet under so that only the page for which you are reading instructions is exposed. Although the tester's manual may not specifically state the instructions for folding under pupil booklets on each page, these instructions are to be carried out throughout the test. Also, you are to check on each new page of items that the child has the correct page exposed. (The one exception to these instructions occurs in Form 2-04 where pages 10 and 11 should be exposed simultaneously.)

If a child indicates that he does not know an answer, say: "MARK THE ANSWER YOU THINK IS RIGHT." However, do not insist that the child make a response. Do reassure him that there may be questions on material not yet covered in class, but give no further hints.

In the event a child wants to change his response, make sure he has erased the original response before marking another.

If a child talks during the testing period, the tester should remind him reassuringly that he is not to talk, that you will know which answer he thought was the correct one when you look at his booklet.

Watch the children to make sure they are answering the correct item on the correct page. If a child is recording answers in the wrong area, point to the "top," "middle" or "bottom" of the page to show him the location of the item.

Tell the children they are not to do subsequent items on a page until you tell them to do so. Repeat this statement during the test until all children have learned to wait until you have read each question to them before marking their booklets.

The sample page (given before Test 2-03) is to be used for helping the children to understand the directions, vocabulary, and format of the test to follow. Do not tell the child whether his answer is correct. The sample page is being used only to teach the child the method of marking his answers in his booklet.

4. Important Considerations

(a) Do not change wording on any item. We are interested in determining if the children understand the terminology that we have used.

(b) It is imperative that you monitor the children in the group testing situation by walking around and making certain that each child understands the instructions and is marking only one response to each item. Also, the monitoring will permit you to make sure that each child is working independently of the other children in the group.

(c) Administer Form 2-03 to all children within the school (if possible) before you start any Form 2-04. For each child, Form 2-03 should be given before Form 2-04.

(d) On each answer booklet, fill in your name and date of testing.

(e) At the end of each day of testing, record on your Time Sheet the number of group tests you have administered and the hours worked that day. It is essential that we have this information before payment can be made.

TESTER'S MANUAL - FORM 2-03

1. General Directions

After the children are seated, put the answer booklet for Form 2-03 in front of the child making certain each child gets the booklet with his name label on it. Ask the children to please wait to open their booklets until you ask them to do so.

On top of the booklet, place the Sample Page for Form 2-03. (No name is needed on these.)

2. Purpose of Sample Page

The Sample Page is to be used for helping the children understand the directions, vocabulary, and format of the test to follow. Try to make certain that any questions the children may have about "top," "middle," and "bottom," "marking," "picture," "boxes," etc., are answered in doing the Sample Page.

Be sure that each child marks one and only one item in each row where there are multiple choices. (Exceptions to this statement are Item 9 on page 5, Item 10 on page 6, and Item 17 on page 8.)

Do not tell a child whether his answer is correct. The Sample Page is being used only to teach the test format and method of marking answers in the booklet.

Do not change wording of directions on any item since many measure the child's knowledge of vocabulary.

3. Directions for Sample Page

(Have your Sample Page on top of your copy of the pupil booklet.)

EACH OF YOU HAS A PAPER ON YOUR BOOKLET. IT IS A PRACTICE PAGE. (Hold up Sample Page. If anyone opens booklet, tell him to wait until you are all ready to work on it together.)

I WILL READ EACH QUESTION, AND YOU WILL MARK YOUR ANSWER ON THE PAPER BELOW THE QUESTION. WE WILL READ EACH QUESTION TOGETHER, SO PLEASE WAIT TO GO ON TO THE NEXT QUESTION UNTIL EVERYONE IS READY.

LOOK AT THE QUESTION AT THE TOP OF THE PAGE. DO YOU KNOW WHAT I MEAN BY 'TOP OF THE PAGE'? (Discuss and explain if there are children who do not know or seem confused by "top.")

THERE IS A QUESTION WRITTEN AT THE TOP OF THE PAGE. THERE ARE BOXES WITH DOTS BELOW IT. (Check on their understanding of "boxes" and "below.")

I AM GOING TO READ THE QUESTION TO YOU. YOU ARE TO MARK THE BOX THAT BEST ANSWERS THE QUESTION. DO YOU KNOW WHAT 'MARK' MEANS? (Pause for responses and reinforce those offered. They may use any system of marking that is familiar to them, i.e. circle, cross, underline, etc.)

YES, YOU MAY (CIRCLE, ×, etc.) THE BOX THAT BEST ANSWERS THE QUESTION.

IF YOU NEED THINGS TO COUNT, USE YOUR FINGERS OR MAKE MARKS ON THE PAGE.

ARE YOU READY?

LISTEN CAREFULLY TO THE QUESTION AND THEN MARK ONE OF THE BOXES UNDER THE QUESTION.

Sample Page

(Top) (1) THE QUESTION AT THE TOP OF THE PAGE IS:
WHICH PICTURE HAS THREE DOTS AND ONE DOT? (Pause)

MARK THE PICTURE THAT HAS THREE DOTS AND ONE DOT. MAKE A BIG MARK THAT IS EASY TO SEE. (Pause while all children finish. Make sure each child has marked <u>one</u> box in the <u>top</u> row. Don't tell them what the correct answer is.)

(Middle) (2) NOW LOOK AT THE MIDDLE OF THE PAGE. DO YOU KNOW WHAT I MEAN BY 'MIDDLE OF THE PAGE'? (Explain if necessary.)

THERE IS A QUESTION WRITTEN IN THE MIDDLE OF THE PAGE. UNDER IT ARE SOME NUMBERS.
NOW I AM GOING TO READ THE QUESTION.
JOHNNY HAS ONE PENCIL. IF HE LOSES THIS PENCIL, THEN HOW MANY PENCILS WILL HE HAVE? (Pause)

JOHNNY HAS ONE PENCIL. IF HE LOSES THIS PENCIL, THEN HOW MANY PENCILS WILL HE HAVE? MARK THE NUMBER THAT TELLS HOW MANY PENCILS JOHNNY WILL HAVE. (Pause)

(Bottom) (3) NOW LOOK AT THE BOTTOM OF THE PAGE. DO YOU KNOW WHAT 'BOTTOM' MEANS? (Explain if necessary.) THIS TIME YOU ARE TO WRITE THE NUMBER IN THE BOX THAT ANSWERS THE QUESTION.

THE QUESTION IS:
IF YOU ARE COUNTING, WHAT NUMBER COMES <u>AFTER</u> TWO?
WRITE THE NUMBER IN THE BOX. (Pause)
WRITE THE NUMBER THAT COMES AFTER TWO. (Pause)

DO YOU HAVE ANY OTHER QUESTIONS? (Pause and discuss any raised.) REMEMBER, IF YOU NEED TO COUNT, YOU CAN MAKE MARKS ON THE PAGE. I WILL READ EACH QUESTION AND YOU WILL MARK YOUR ANSWER IN THE BOOKLET BELOW THE QUESTION. WE WILL READ EACH QUESTION TOGETHER, SO PLEASE WAIT TO GO ON TO THE NEXT QUESTION UNTIL EVERYONE IS READY.

NOW, OPEN YOUR BOOKLETS TO PAGE 3. (Make certain each child has turned to page 3.)

Page 3 of Pupil Booklet:

(Top) (1) LOOK AT THE TOP OF THE PAGE. THERE IS A PICTURE OF A PIECE OF STRING. YOUR BOOKLET SAYS, 'HERE IS A PIECE OF STRING. MARK AN × ON THE STRING.' (Pause)

YOU ARE TO MARK AN × ON THE STRING.
(Pause for children to make their responses.)

(Middle) (2) NOW LOOK AT THE MIDDLE OF THE PAGE. THERE ARE SOME NUMBERS WITH DOTS BETWEEN THEM. YOUR BOOKLET SAYS, 'HOW MANY DOTS ARE BETWEEN THE FOUR AND THE FIVE'?

MARK THE BOX IN THE MIDDLE OF THE PAGE THAT SHOWS HOW MANY DOTS ARE BETWEEN THE FOUR AND THE FIVE.
(Pause)

(Bottom) (3) LOOK AT THE BOTTOM OF THE PAGE. THERE ARE MORE BOXES WITH NUMBERS UNDER THE QUESTION. THE QUESTION IS, 'IF YOU HAVE FOUR MARBLES AND I HAVE AS MANY MARBLES AS YOU, HOW MANY MARBLES DO I HAVE?'

MARK THE BOX TO SHOW HOW MANY MARBLES I HAVE. (Pause) REMEMBER, YOU HAVE FOUR MARBLES AND I HAVE AS MANY MARBLES AS YOU. (Pause)

TURN TO PAGE 4. (Pause)

NOW FOLD YOUR BOOKLETS SO THAT YOU CAN ONLY SEE PAGE 4.

(Demonstrate with your booklet while making the preceding statement. Help each child to fold pages at spine.)
(Make sure each child has page 4 showing.)

Page 4 of Pupil Booklet:

(Top) (4) LOOK AT THE TOP OF THE PAGE. THERE ARE PICTURES OF THREE SQUARES. (Pause)

LOOK AT THE X's IN THESE PICTURES. MARK THE PICTURE THAT SHOWS AN X OUTSIDE THE SQUARE. (Pause)

REMEMBER, MARK THE PICTURE THAT SHOWS AN X OUTSIDE THE SQUARE. (Pause)

(Middle) (5) NOW LOOK AT THE MIDDLE OF THE PAGE. THERE IS AN EMPTY BOX. PUT YOUR FINGER ON THE EMPTY BOX IN THE MIDDLE OF THE PAGE. (Pause and make certain every child is pointing to the appropriate box.)

YOU ARE TO WRITE SOME X's IN THE EMPTY BOX. PUT MORE THAN THREE X's IN THE BOX. (Pause)

PUT MORE THAN THREE X's IN THE EMPTY BOX. (Pause)

(Bottom) (6) NOW LOOK AT THE BOTTOM OF THE PAGE. THERE ARE PICTURES OF SOME TOYS IN WATER. (Pause)

THESE TOYS ARE FLOATING IN A LINE. MARK THE TOY THAT COMES BEFORE THE FISH. (Pause)

MARK THE TOY THAT COMES BEFORE THE FISH.
(Pause for children to mark answer.)

TURN YOUR BOOKLETS OVER SO THAT YOU CAN SEE PAGE 5.
(Check each child to make sure he has page 5 showing.)

Page 5 of Pupil Booklet:

(Top) (7) LOOK AT THE TOP OF THE PAGE. IT SAYS, 'WHAT IS THE DIFFERENCE BETWEEN FIVE AND THREE?'

MARK THE BOX BELOW THE QUESTION THAT SHOWS THE DIFFERENCE BETWEEN FIVE AND THREE. (Pause)

(Middle) (8) NOW LOOK AT THE MIDDLE OF THE PAGE. THERE IS AN EMPTY BOX. PUT YOUR FINGER ON THE EMPTY BOX. (Pause and make certain every child is pointing to the appropriate box.)

THINK OF ANY NUMBER GREATER THAN TEN. WRITE IT IN THE EMPTY BOX. (Pause)

WRITE ANY NUMBER GREATER THAN TEN IN THE EMPTY BOX. (Pause)

(Bottom) (9) LOOK AT THE BOTTOM OF THE PAGE. ABOVE THE THREE BOXES IT SAYS, 'HERE ARE SOME DOTS AND SOME X's. MARK THE BOX WHICH HAS ONE DOT AND TWO X's IN IT.' (Pause)

YOU ARE TO MARK THE BOX WHICH HAS ONE DOT AND TWO X's IN IT. (Pause)

(There may be more than one box marked on this item. If so, do not tell the child to change his answer.)

TURN TO PAGE 6.

(Make sure each child turns to page 6, folds his booklet under, and has page 6 showing.)

Page 6 of Pupil Booklet:

(Top) (10) LOOK AT THE TOP OF THE PAGE. IT SAYS, 'PRETEND THAT YOU JOINED TWO SETS OF THINGS TO GET THIS SET.'

POINT TO THE SET OF THINGS JUST UNDER THE SENTENCE I READ TO YOU. (Check to make sure that each child is pointing to the oval at the top of the page which contains , , and .)

NOW, LOOK AT THE SETS OF THINGS BELOW THE SET YOU JUST POINTED TO. (Make sure each child is attending to the six sets below.)

'MARK THE TWO SETS BELOW THAT YOU JOIN TO GET THE SET ABOVE.' (Pause)

REMEMBER, MARK THE TWO SETS THAT YOU JOIN TO GET THE SET AT THE TOP OF THE PAGE. (Pause) (Two sets should be marked here rather than one as in the majority of items. If a child does not mark two sets after the above instructions, do not instruct him further.)

(Bottom) (11) LOOK AT THE BOTTOM OF THE PAGE. THERE ARE PICTURES OF THREE BOXES WITH CIRCLES AND X's IN THEM. (Check that each child is looking at the correct portion of the page.)

'MARK THE PICTURE THAT SHOWS AS MANY CIRCLES AS X's.' (Pause)

MARK THE BOX THAT SHOWS AS MANY CIRCLES AS X's.

TURN TO THE NEXT PAGE.
(Make sure everyone has turned to page 7.)

Page 7 of Pupil Booklet:

(Top) (12) LOOK AT THE TOP OF THE PAGE. IT SAYS, 'PRETEND THAT YOU ARE COUNTING. WHAT NUMBER COMES AFTER SIX? WRITE IT IN THE BOX.' (Pause)

WRITE IN THE BOX THE NUMBER THAT COMES AFTER SIX. (Pause)

(Middle) (13) NOW LOOK AT THE MIDDLE OF THE PAGE. THERE IS ANOTHER EMPTY BOX BELOW THE LINE. (Make sure everyone is attending to the correct box.)

'YOU ARE TO WRITE SOME X's IN THE EMPTY BOX. PUT FEWER THAN FOUR X's IN THE BOX.' (Pause)

PUT FEWER THAN FOUR X's IN THE EMPTY BOX. (Pause)

(Bottom) (14) LOOK AT THE BOTTOM OF THE PAGE. THERE ARE FOUR BOXES. (Make sure each child is attending as you read each box.)

THE FIRST ONE SAYS, 'ADD,' THE NEXT SAYS, 'SUBTRACT,' THE NEXT SAYS, 'MULTIPLE,' AND THE LAST BOX SAYS, 'DIVIDE.' NOW, WHAT WOULD YOU DO TO FIND THE SUM OF TWO NUMBERS? (Pause)

MARK THE BOX WHICH SAYS WHAT YOU DO TO FIND THE SUM OF TWO NUMBERS. REMEMBER, THE FIRST BOX SAYS, 'ADD,' THE NEXT SAYS, 'SUBTRACT,' THE NEXT SAYS, 'MULTIPLY,' AND THE LAST BOX SAYS, 'DIVIDE.' (Pause)

TURN TO THE NEXT PAGE.
(Make sure each child turns to page 8.)

Page 8 of Pupil Booklet:

(Top) (15) LOOK AT THE TOP OF THE PAGE. THERE ARE THREE CIRCLES WITH X's.

'LOOK AT THE X's IN THESE PICTURES. MARK THE PICTURE THAT SHOWS AN X INSIDE THE CIRCLE.' (Pause)

MARK THE ONE THAT SHOWS AN X INSIDE THE CIRCLE. (Pause while children make their responses.)

(Middle) (16) NOW LOOK AT THE MIDDLE OF THE PAGE. YOU WILL SEE SOME BASEBALLS. BELOW THE BASEBALLS ARE THREE BOXES WITH BASEBALL BATS IN THEM. (Check that each child is oriented to the set of balls and the bats.)

IT SAYS, 'HERE IS A SET OF SIX BALLS. MARK THE SET THAT HAS FEWER BATS THAN THE SET OF BALLS.' (Pause)

MARK THE SET THAT HAS FEWER BATS THAN THE SET OF SIX BALLS. (Pause)

(Bottom) (17) LOOK AT THE BOTTOM OF THE PAGE. THERE ARE THREE BOXES. IT SAYS, 'HERE ARE SOME DOTS AND SOME X's. MARK THE BOX WHICH HAS ONE DOT, OR MARK THE BOX WHICH HAS TWO X's.' (Pause)

MARK THE BOX WHICH HAS ONE DOT, OR MARK THE BOX WHICH HAS TWO X's. (Pause) (After the directions are given for the second time, give no further hints or information. If a child marks more than one box here, do not tell the child to change his answer.)

TURN TO THE NEXT PAGE.
(Make sure each child turns to page 9.)

Page 9 of Pupil Booklet:

(Top) (18) LOOK AT THE TOP OF THE PAGE. THE QUESTION IS, 'WHICH ONE OF THESE SENTENCES SHOWS THAT YOU CAN GET A SET OF TWELVE THINGS BY JOINING TWO SETS?' BELOW THIS QUESTION ARE FOUR BOXES. EACH ONE HAS A MATHEMATICAL SENTENCE IN IT.

YOU ARE TO MARK THE SENTENCE WHICH SHOWS THAT YOU CAN GET A SET OF TWELVE THINGS BY JOINING TWO SETS.
(Pause)

(Middle) (19) NOW LOOK AT THE MIDDLE OF THE PAGE.
(Make certain every child is oriented to item 19.)

THERE IS ANOTHER QUESTION WITH SOME SENTENCES IN BOXES BELOW IT. IT SAYS, 'PRETEND THAT YOU ARE TO FIND THE DIFFERENCE BETWEEN THREE AND TWO. WHICH SENTENCE WOULD YOU USE?' (Pause)

MARK THE SENTENCE WHICH SHOWS THE DIFFERENCE BETWEEN THREE AND TWO.
(Pause while children make responses.)

TURN TO THE NEXT PAGE.
(Make sure each child has turned to page 10.)

Page 10 of Pupil Booklet:

(Top) (20) LOOK AT THE TOP OF THE PAGE. THERE ARE SOME BOXES WITH NUMBERS IN THEM. THE QUESTION IS, 'WHICH NUMBER IS GREATER THAN TWO?' (Pause)

MARK THE BOX THAT SHOWS A NUMBER GREATER THAN TWO. (Pause)

(Middle) (21) NOW LOOK AT THE MIDDLE OF THE PAGE. THERE ARE SOME BOXES WITH SENTENCES IN THEM. 'WHICH ONE OF THESE SENTENCES SHOWS THAT YOU CAN GET A SET OF SIX THINGS BY REMOVING SOME THINGS FROM A LARGER SET?' (Pause)

MARK THE BOX WITH THE SENTENCE THAT SHOWS YOU CAN GET A SET OF SIX THINGS BY REMOVING SOME THINGS FROM A LARGER SET. (Pause)

TURN TO THE NEXT PAGE.
(Make sure everyone has turned to page 11.)

Page 11 of Pupil Booklet

(Top) (22) LOOK AT THE TOP OF THE PAGE. YOU WILL SEE SOME FORKS. BELOW THE FORKS ARE THREE BOXES WITH SPOONS IN THEM. (Check that each child is oriented to the forks and the spoons.)

IT SAYS, 'HERE IS A SET OF FIVE FORKS. MARK THE SET THAT HAS MORE SPOONS THAN THE SET OF FORKS.' (Pause)

MARK THE SET THAT HAS MORE SPOONS THAN THE SET OF FIVE FORKS. (Pause)

(Middle) (23) NOW LOOK AT THE MIDDLE OF THE PAGE. THERE IS A ROW OF NUMBERS. BELOW THERE ARE SOME EMPTY BOXES. IT SAYS, 'THERE IS A NUMBER MISSING ABOVE. THE MISSING NUMBER COMES (pause) BEFORE 5 AND 7, (pause) BETWEEN 5 AND 7, (pause) AFTER 5 AND 7.'

MARK THE BOX BESIDE THE WORDS WHICH SHOW WHETHER THE MISSING NUMBER COMES BEFORE 5 AND 7, BETWEEN 5 AND 7, OR AFTER 5 AND 7.
(Pause for children to make their responses.)

TURN TO THE NEXT PAGE.
(Make sure each child has turned to page 12, not 13.)

Page 12 of Pupil Booklet:

WE HAVE A BLANK PAGE HERE. LET'S USE IT FOR STANDING UP AND STRETCHING.

(Allow the children to move about for two or three minutes. Do not, however, allow them to run about the room.)

ALL RIGHT, LET'S GO BACK TO THE BOOKLETS.

(Before starting with page 13, make certain that each child is settled down enough to concentrate again.)

TURN TO THE NEXT PAGE.
(Make sure each child has turned to page 13.)

Page 13 of Pupil Booklet:

(Top) (24) LOOK AT THE TOP OF THE PAGE. THERE ARE BOXES WITH PICTURES INSIDE. 'WHICH PICTURE SHOWS TWO PLUS THREE EQUALS FIVE?' (Pause)

MARK THE BOX THAT SHOWS TWO PLUS THREE EQUALS FIVE. (Pause)

(Middle) (25) LOOK AT THE BOXES WITH X's IN THE MIDDLE OF THE PAGE. YOUR BOOKLET SAYS, 'SUPPOSE YOU HAVE THESE PICTURES. WHICH HAS TWO SETS THAT CAN BE JOINED TO SHOW THREE PLUS FOUR EQUALS SEVEN?' (Pause)

MARK THE BOX THAT HAS TWO SETS THAT CAN BE JOINED TO SHOW THREE PLUS FOUR EQUALS SEVEN. (Pause)

(Bottom) (26) LOOK AT THE BOXES AT THE BOTTOM OF THE PAGE. 'WHICH PICTURE SHOWS FIVE MINUS TWO EQUALS THREE? (Pause)

MARK THE BOX WHICH SHOWS FIVE MINUS TWO EQUALS THREE. (Pause)

TURN TO THE NEXT PAGE.
(Make certain everyone has turned to page 14.)

Page 14 of Pupil Booklet:

(Top) (27) LOOK AT THE BOXES ON THE TOP PART OF THE PAGE. 'SUPPOSE YOU HAVE THESE SETS OF THINGS. HOW CAN YOU SHOW THAT FIVE MINUS FOUR EQUALS ONE?' (Pause)

NOW WATCH ME CAREFULLY AS I SHOW YOU WHAT EACH BOX SAYS. (Point to lefthand box in top row and make sure each child is pointing to the appropriate box in his booklet.)

THIS BOX SAYS, '<u>JOIN</u>' THE FIRST SET '<u>TO</u>' THE SECOND SET. THE NEXT BOX (Again make sure children are pointing to the righthand box in top row.) ALSO SAYS TO '<u>JOIN</u>' THE FIRST SET '<u>TO</u>' THE SECOND SET.

NOW LOOK AT THE BOX BELOW THESE TWO. (Check that each child is pointing to appropriate box.) THIS BOX SAYS, '<u>REMOVE</u>' THE FIRST SET '<u>FROM</u>' THE SECOND.

MARK THE BOX THAT SHOWS THAT FIVE MINUS FOUR EQUALS ONE. EACH OF THE BOXES ON THE TOP ROW SAYS '<u>JOIN</u>' THE FIRST SET '<u>TO</u>' THE SECOND SET. THE BOX BY ITSELF ON THE NEXT ROW SAYS '<u>REMOVE</u>' THE FIRST SET FROM THE SECOND. (Pause)

(Middle) (28) LOOK AT THE MIDDLE OF THE PAGE. 'HERE IS A SET OF X's AND O's. IF WE REMOVE ALL OF THE X's, HOW MANY O's ARE LEFT?' (Pause)

MARK THE BOX THAT SHOWS HOW MANY O's ARE LEFT IF WE REMOVE ALL OF THE X's. (Pause)

(Bottom) (29) LOOK AT THE STARS AT THE BOTTOM OF THE PAGE. 'THIS PICTURE HAD 13 STARS. SOME WERE ERASED. HOW MANY WERE ERASED?' (Pause)

MARK THE BOX THAT SHOWS HOW MANY STARS WERE ERASED. (Pause)

TURN TO THE NEXT PAGE.
(Make sure everyone has turned to <u>page 15</u>.)

Page 15 of Pupil Booklet:

(Top) (30) LOOK AT THE TOP OF THE PAGE. YOUR BOOKLET SAYS, 'HERE ARE SOME SETS OF OBJECTS. JOIN ALL THE SETS TOGETHER. HOW MANY OBJECTS ARE IN THE NEW SET?' (Pause)

MARK THE BOX THAT SHOWS HOW MANY OBJECTS ARE IN THE NEW SET AFTER YOU JOIN ALL THE SETS TOGETHER. (Pause)

(Middle) (31) LOOK AT THE DOTS IN THE MIDDLE OF THE PAGE. THE QUESTION IS, 'HOW MANY DOTS?' (Pause)

MARK THE BOX THAT SHOWS HOW MANY DOTS THERE ARE. (Pause)

TURN TO THE NEXT PAGE. THERE IS NOTHING ON THIS PAGE, SO LET'S TURN TO THE NEXT PAGE.

(Make certain each child has turned to page 17.)

Page 17 of Pupil Booklet:

(Top) (32) LOOK AT THE PICTURE AT THE TOP OF THE PAGE. 'WHICH PICTURE BELOW HAS FEWER DOTS THAN THE PICTURE AT THE TOP?' (Pause)

MARK THE PICTURE WHICH HAS FEWER DOTS THAN THE PICTURE AT THE TOP OF THE PAGE. (Pause)

(Middle) (33) LOOK AT THE NUMBERS IN THE MIDDLE OF THE PAGE. 'WHICH NUMBER IS BETWEEN FOUR AND SEVEN?' (Pause)

MARK THE NUMBER THAT IS BETWEEN FOUR AND SEVEN. (Pause)

(Bottom) (34) LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE. 'WHICH MEANS THE LEAST NUMBER OF THINGS?' (Pause)

MARK THE NUMBER THAT MEANS THE LEAST NUMBER OF THINGS. (Pause)

TURN TO THE NEXT PAGE.
(Make sure everyone has turned to page 18.)

Page 18 of Pupil Booklet:

(Top) (35) LOOK AT THE BOX AT THE TOP OF THE PAGE. LISTEN TO THE STORY, THEN WRITE YOUR ANSWER IN THE BOX.

'JOHN WAS THE 6TH CHILD TO CROSS THE BRIDGE. HOW MANY CROSSED BEFORE HE DID?'

WRITE THE NUMBER IN THE BOX. (Pause)

JOHN WAS THE 6TH CHILD TO CROSS THE BRIDGE. HOW MANY CROSSED BEFORE HE DID? WRITE THE NUMBER IN THE BOX AT THE TOP OF THE PAGE. (Pause)

(Middle) (36) LOOK AT THE BOX IN THE MIDDLE OF THE PAGE, AND LISTEN TO THE STORY.

'I SIT IN THE 2ND SEAT. YOU SIT IN THE 5TH SEAT. HOW MANY SEATS BETWEEN US?'

WRITE THE NUMBER IN THE BOX. (Pause)

I SIT IN THE 2ND SEAT. YOU SIT IN THE 5TH SEAT. HOW MANY SEATS ARE THERE BETWEEN US? WRITE THE NUMBER IN THE BOX IN THE MIDDLE OF THE PAGE. (Pause)

(Bottom) (37) LOOK AT THE BOX AT THE BOTTOM OF THE PAGE. 'WE ARE FILLING 6 BOXES WITH BOOKS. WE HAVE FILLED THE 4TH BOX. HOW MANY MORE BOXES ARE THERE TO FILL?'

WRITE THE NUMBER IN THE BOX AT THE BOTTOM OF THE PAGE. (Pause)

WE ARE FILLING 6 BOXES WITH BOOKS. WE HAVE FILLED THE 4TH BOX. HOW MANY MORE BOXES ARE THERE TO FILL? WRITE THE NUMBER IN THE BOX AT THE BOTTOM OF THE PAGE. (Pause)

TURN TO THE NEXT PAGE.
(Make sure everyone has turned to page 19.)

Page 19 of Pupil Booklet:

(Top) (38) LOOK AT THE NUMBERS AT THE TOP OF THE PAGE. 'SUPPOSE THESE NUMBERS WERE PUT IN ORDER. WHICH NUMBER WOULD BE IN THE MIDDLE?'

WRITE THE NUMBER IN THE BOX. (Pause)

WRITE THE NUMBER WHICH WOULD BE IN THE MIDDLE IF THESE NUMBERS WERE PUT IN ORDER. (Pause)

(Middle) (39) LOOK AT THE PICTURES OF THE CHILDREN.

'WHICH OF THESE CHILDREN IS NEXT TO THE LAST IN LINE?' (Pause)

MARK THE CHILD THAT IS NEXT TO LAST IN LINE. (Pause)

SCHOOL
MATHEMATICS
STUDY GROUP

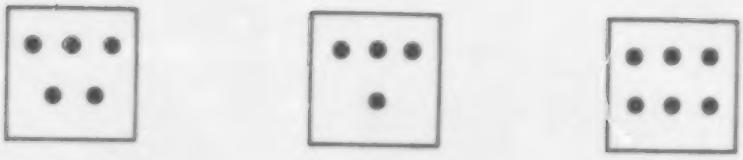
FORM 2-03

Name of tester_____

Date test given_____

Cedar Hall, Stanford University
Stanford, California

(1) Which picture has three dots and one dot?



(2) Johnny has one pencil. If he loses this pencil, then how many pencils will he have?

(3) If you are counting, what number comes after two?

(1) Here is a piece of string. Mark an X on the string.

---

(2)

1 • 2 • • • 3 • • 4 • • • • 5 • • 6 •

How many dots are between the four and the five?

2	3	4	5

---

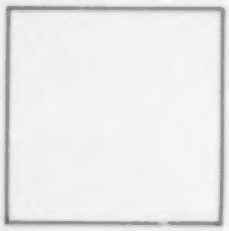
(3) If you have four marbles and I have as many marbles as you, how many marbles do I have?

2	3	4	5

(4) Look at the X's in these pictures. Mark the picture that shows an X <u>outside</u> the square.

---

(5)



You are to write some X's in the empty box. Put <u>more than</u> three X's in the box.

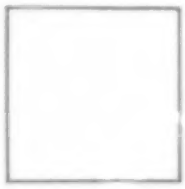
---

(6) These toys are floating in a line. Mark the toy that comes <u>before</u> the fish.

(7) What is the difference between five and three?

---

(8)



Think of any number greater than ten. Write it in the empty box.

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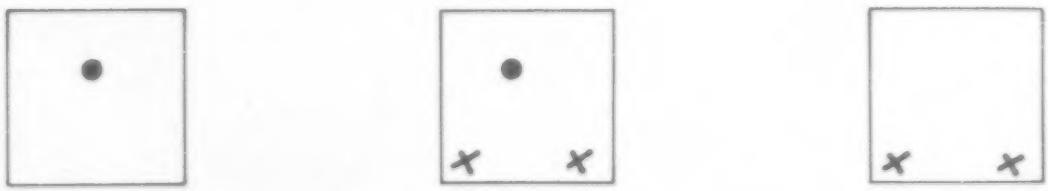
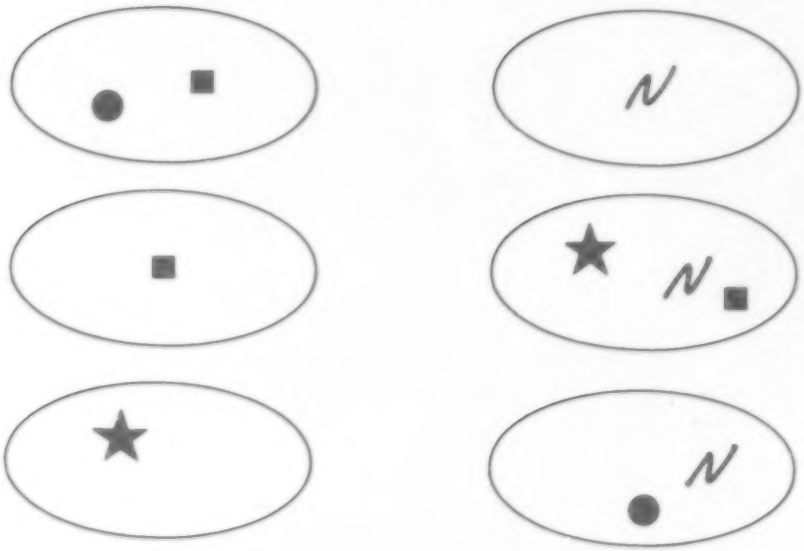
(9) Here are some dots and some X's. Mark the box which has one dot and two X's in it.



10) Pretend that you joined two sets of things to get this set.

Mark the two sets below that you join to get the set above.



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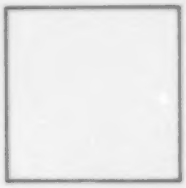
(11) Mark the picture that shows as many circles as X's.

0	X	0
X	0	X
X	0	X

0	X	0
X	X	0
	0	X

0	X	X
X	0	0
	0	

(12) Pretend that you are counting. What number comes <u>after</u> six? Write it in the box.



---

(13)

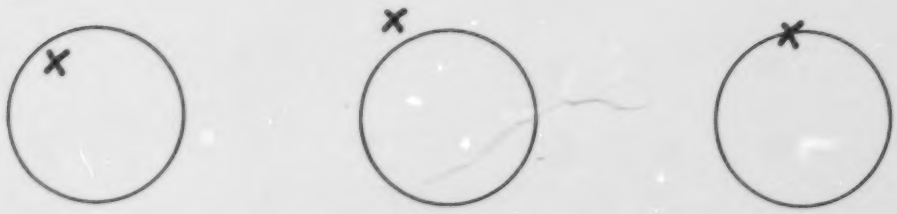
You are to write some X's in the empty box. Put <u>fewer</u> <u>than</u> four X's in the box.

---

(14) What would you do to find the <u>sum</u> of two numbers?

ADD	SUBTRACT	MULTIPLY	DIVIDE

(15) Look at the X's in these pictures. Mark the picture that shows an X inside the circle.



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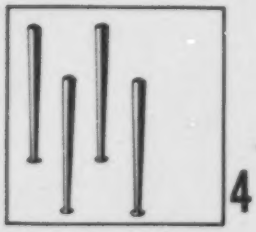
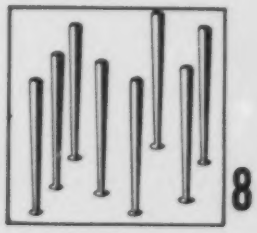
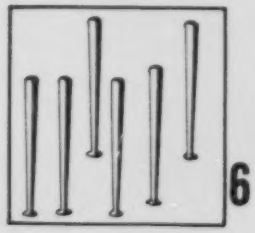
(16)

Here is a set of six balls.

Mark the set that has fewer bats than the set of balls.







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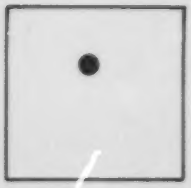
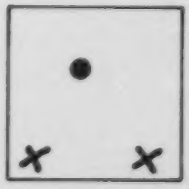
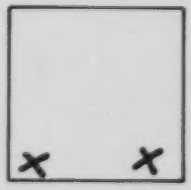
(17) Here are some dots and some X's. Mark the box which has one dot, or mark the box which has two X's.







(18) Which one of these sentences shows that you can get a set of twelve things by joining two sets?

$7 + 5 = 12$

$15 - 3 = 12$

$3 \times 4 = 12$

$\frac{24}{2} = 12$

---

(19) Pretend that you are to find the difference between three and two. Which sentence would you use?

$3 + 2 = 5$

$3 - 2 = 1$

$3 \times 2 = 6$

(20) Which number is greater than two?

$2\frac{1}{2}$	2	1	0

---

(21) Which one of these scntences shows that you can get a set of six things by removing some things from a larger set?

$4 + 2 = 6$

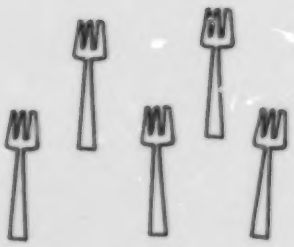
$8 - 2 = 6$

$3 \times 2 = 6$

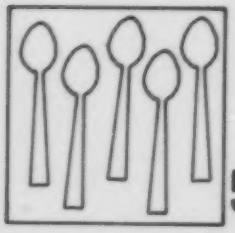
$\frac{12}{2} = 6$

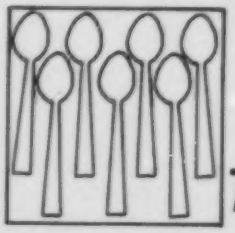
(22)

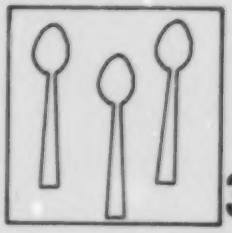
Here is a set of five forks.



Mark the set that has <u>more</u> spoons <u>than</u> the set of forks.







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(23)

1 2 3 4 5 _ 7 8 9

There is a number missing above.

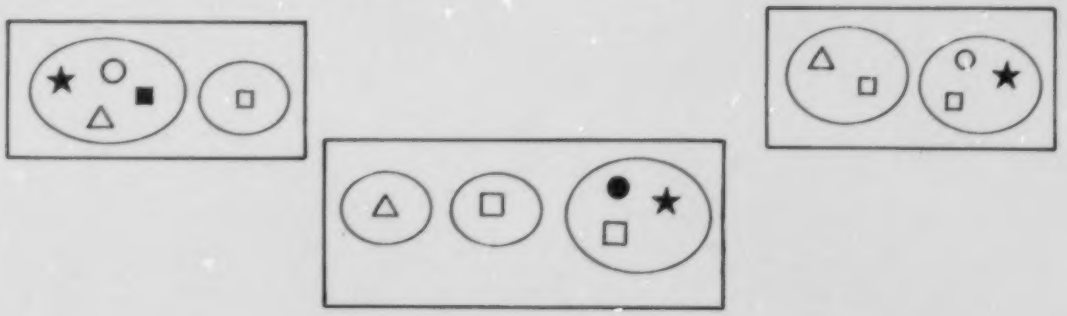
The missing number comes

☐ <u>before</u> 5 and 7

☐ <u>between</u> 5 and 7

☐ <u>after</u> 5 and 7

(24) Which picture shows $2 + 3 = 5$?



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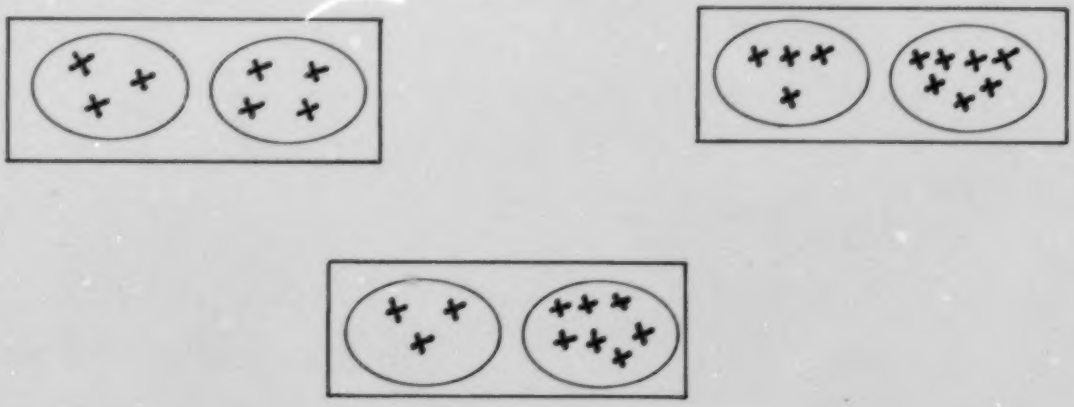
(25) Suppose you have these pictures. Which has two sets that can be joined to show $3 + 4 = 7$?



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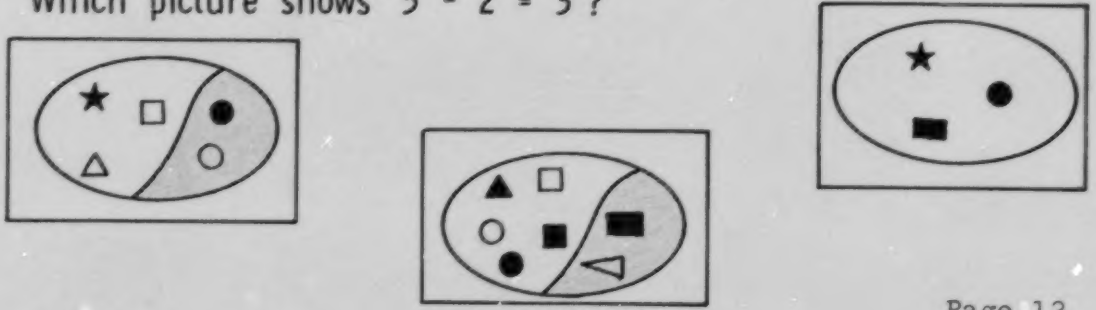
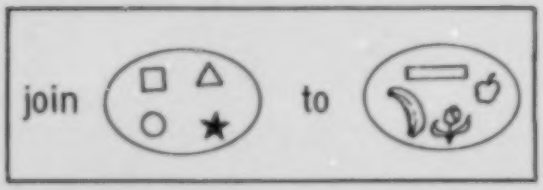
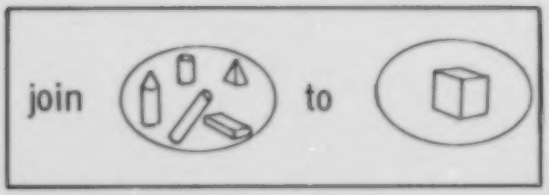
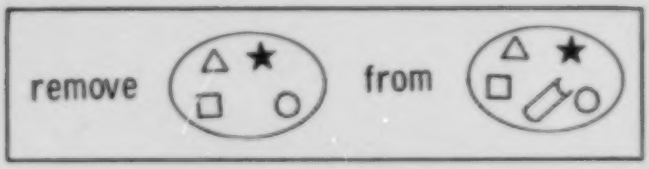
(26) Which picture shows $5 - 2 = 3$?



(27) Suppose you have these sets of things. How can you show that 5 - 4 = 1 ?







---

(28) Here is a set of X's and O's :

X X O
O X X
X O O

If we remove all of the X's how many O's are left?

5 + 4	9 + 5	9 - 5

---

(29)

This picture had 13 stars. Some were erased.
How many were erased?

13 - 5	13 + 5	13 - 2

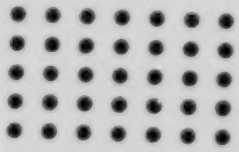
(30) Here are some sets of objects:

Join all the sets together. How many objects are in the new set ?

4 + 2	4	4 × 2

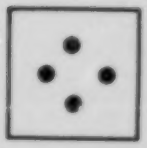
---

(31) How many dots?



7 + 5	7 × 5	7 - 5

(32)



Which picture below has fewer dots than the picture at the top?

---

(33) Which number is between four and seven?

---

(34) Which means the least number of things?

(35) John was the 6th child to cross the bridge.
How many crossed before he did?

---

(36) I sit in the 2nd seat. You sit in the 5th seat.
How many seats between us?

---

(37) We are filling 6 boxes with books. We have filled the 4th box.
How many more to fill?

(38)

4 17 84 9 21

Suppose these numbers were put in order.

Which number would be in the middle?

☐

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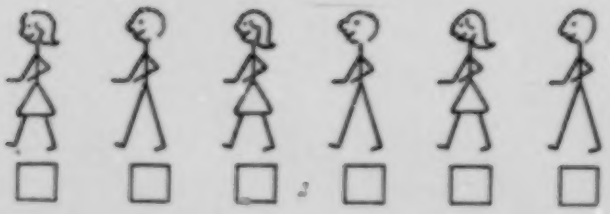
(39)



Which of these children is next to the last in line?

TESTER'S MANUAL - FORM 2-04

General Directions

After the children are seated, put an answer booklet for Form 2-04 in front of each child making certain each child gets the booklet with his name label on it. The tester should have his copy of the answer booklet in front of him as well as the tester's manual.

I AM GOING TO READ YOU SOME QUESTIONS, AND YOU WILL MARK YOUR ANSWERS IN THE BOOKLETS BELOW THE QUESTIONS. WE WILL READ EACH QUESTION TOGETHER, SO PLEASE WAIT TO GO ON TO THE NEXT QUESTION UNTIL EVERYONE IS READY. PLEASE DO NOT WORK AHEAD.

IF YOU NEED THINGS TO COUNT, USE YOUR FINGERS OR MAKE MARKS ON THE PAGES.

NOW, OPEN YOUR BOOKLETS TO PAGE 3.
(Make sure that each child is now on page 3 of his booklet.)

During the test, watch the children carefully to make sure they are on the right page and also on the right part (top, middle, or bottom) of the page. Also, make sure that the children are marking only one answer. Adhere to the wording of the directions as they are given.

Page 3 of Pupil Booklet:

(Top) (1) LOOK AT THE NUMBERS AT THE TOP OF THE PAGE.
WHICH NUMBER HAS A FIVE IN THE TENS PLACE? (Pause)

MARK THE NUMBER THAT HAS A FIVE IN THE TENS PLACE.
(Pause)

(Middle) (2) LOOK AT THE NUMBER TWENTY-EIGHT IN THE MIDDLE OF THE PAGE.
WHICH NUMBER SHOWS HOW MANY TENS? (Pause)

WRITE THE NUMBER THAT TELLS HOW MANY TENS ARE IN TWENTY-EIGHT. (Pause)

(Bottom) (3) NOW LET'S GO TO THE BOTTOM OF THE PAGE. LOOK AT THE PICTURE.
HOW MANY TENS ARE THERE? (Pause)

WRITE THE NUMBER THAT TELLS HOW MANY GROUPS OF TEN ARE IN THE PICTURE. (Pause)

TURN TO PAGE 4. (Pause) NOW FOLD YOUR BOOKLETS SO THAT YOU CAN ONLY SEE PAGE 4.

(Demonstrate with your booklet while making preceding statement.
Help each child to fold pages at spine.
Make sure each child has page 4 showing.)

Page 4 of Pupil Booklet:

(Top) (4) LOOK AT THE NUMBER THIRTY-SEVEN AT THE TOP OF THE PAGE.
WHICH NUMBER IS IN THE ONES PLACE? (Pause)

WRITE THE NUMBER THAT TELLS HOW MANY ONES. (Pause)

(Middle) (5) LOOK AT THE NUMBERS IN THE MIDDLE OF THE PAGE.
WHICH NUMBER IS THREE HUNDRED THREE? (Pause)

MARK THE NUMBER THAT IS THREE HUNDRED THREE. (Pause)

(Bottom) (6) LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE.
WRITE A NUMBER IN THE BOX TO MAKE THE SENTENCE TRUE.
(Pause)

WRITE A NUMBER IN THE BOX TO MAKE THE SENTENCE CORRECT. (Pause)

TURN YOUR BOOKLETS OVER SO THAT YOU CAN SEE PAGE 5.
(Check each child to make sure he has page 5 showing.)

Page 5 of Pupil Booklet:

(Top) (7) LOOK AT THE NUMBERS AT THE TOP OF THE PAGE.
WHICH OF THESE IS A NAME FOR TEN TENS? (Pause)

MARK THE NUMBER THAT IS A NAME FOR TEN TENS. (Pause)

(Middle) (8) LOOK AT THE NUMBERS IN THE MIDDLE OF THE PAGE.
WHICH OF THESE IS A NAME FOR SIX TENS AND THIRTEEN ONES? (Pause)

MARK THE NUMBER THAT IS A NAME FOR SIX TENS AND THIRTEEN ONES. (Pause)

TURN TO PAGE 7.
(Make sure the child has page 7 showing. If any child is concerned that page 6 has been omitted, mention that the blank page has not been numbered.)

Page 7 of Pupil Booklet:

(Top) (9) LOOK AT THE QUESTION AT THE TOP OF THE PAGE. IT SAYS, 'WHAT NUMBERS GO IN THE EMPTY BOXES?' NOW, LOOK AT THE NUMBER LINE AT THE TOP OF THE PAGE. WHAT NUMBER GOES IN THE EMPTY BOX? (Pause)

WRITE THE NUMBER THAT GOES IN THE EMPTY BOX. (Pause)

(Middle) (10) LOOK AT THE NUMBER LINE IN THE MIDDLE OF THE PAGE. WHAT NUMBER GOES IN THE EMPTY BOX? (Pause)

WRITE THE NUMBER THAT GOES IN THE EMPTY BOX. (Pause)

(Bottom) (11) LOOK AT THE NUMBER LINE AT THE BOTTOM OF THE PAGE. WHAT NUMBER GOES IN THE EMPTY BOX? (Pause)

WRITE THE NUMBER THAT GOES IN THE EMPTY BOX. (Pause)

TURN TO PAGE 8.
(Make certain each child turns to page 8.)

Page 8 of Pupil Booklet:

(Top) (12) LOOK AT THE NUMBER LINE AT THE TOP OF THE PAGE. WHICH NUMBER GOES IN THE EMPTY BOX? (Pause)

WRITE THE NUMBER THAT GOES IN THE EMPTY BOX. (Pause)

(Middle) (13) LOOK AT THE NUMBER LINE IN THE MIDDLE OF THE PAGE AND THE NUMBER SENTENCES BELOW THE LINE. WHICH NUMBER SENTENCE DO THESE ARROWS SHOW? (Pause)

MARK THE NUMBER SENTENCE THAT THE ARROWS ON THE NUMBER LINE SHOW. (Pause)

(Bottom) (14) LOOK AT THE NUMBER LINE AT THE BOTTOM OF THE PAGE. DRAW ARROWS TO SHOW THREE PLUS FIVE EQUALS EIGHT. (Pause)

ON THE NUMBER LINE AT THE BOTTOM OF THE PAGE, DRAW ARROWS TO SHOW THREE PLUS FIVE EQUALS EIGHT. (Pause)

TURN YOUR BOOKLETS OVER SO THAT YOU CAN SEE PAGE 9.

Page 9 of Pupil Booklet:

(Top) (15) WHICH PICTURE GOES WITH TEN MINUS SEVEN EQUALS THREE? (Pause)

PUT A MARK NEXT TO THE NUMBER LINE THAT GOES WITH THE SENTENCE TEN MINUS SEVEN EQUALS THREE. (Pause)

TURN TO PAGE 10.
(Make certain each child turns to page 10.)

DON'T FOLD YOUR BOOKLETS OVER THIS TIME.

Page 10 of Pupil Booklet:

LOOK AT THE PAGE THAT HAS SHAPES ON IT. (Read very slowly.) AT THE TOP OF THE PAGE, IT SAYS, 'BELOW THE LINE ARE SOME SHAPES. SOME ARE SMALL. SOME ARE MEDIUM. SOME ARE LARGE. (Pause)

SOME ARE TRIANGLES. SOME ARE CIRCLES. SOME ARE SQUARES. (Pause)

SOME ARE SHADED. SOME ARE PLAIN. (Pause)

IF YOU LOOK BELOW THE LINE, YOU WILL SEE SOME SMALL SQUARES AND SMALL TRIANGLES AS WELL AS SMALL CIRCLES. (Check to make sure each child can find a small square and a small triangle as well as a small circle.)

ANY OF THE SHAPES CAN BE SMALL, OR MEDIUM, OR LARGE. LOOK AT THE MEDIUM AND LARGE CIRCLES, TRIANGLES AND SQUARES ON YOUR SHEET. (Check to make sure each child can find medium-sized circles, squares, and triangles, and then large circles, squares, and triangles.)

BELOW THE LINE YOU CAN SEE THERE ARE SHADED AND PLAIN TRIANGLES, SHADED AND PLAIN SQUARES, AND SHADED AND PLAIN CIRCLES. DO YOU KNOW WHICH SHAPES BELOW THE LINE ARE PLAIN AND WHICH ARE SHADED? (Make sure each child can find shaded and plain shapes below the line.) ARE THERE ANY QUESTIONS?

ON THE PAGE NEXT TO THE SHAPES THERE ARE SOME QUESTIONS. YOU HAVE TO LOOK AT THE SHAPES BELOW THE LINE TO ANSWER THE QUESTIONS. LOOK ONLY AT THE SHAPES BELOW THE LINE WHEN YOU ARE ANSWERING THE QUESTIONS.

(The tester must check constantly to be sure that the children are not including shapes above the line in counting and are putting their answers in the right box when answering questions on this page.)

LOOK AT THE PAGE NEXT TO THE SHAPES.

The directions for items 16-22 are not reproduced in this report. After the booklets had been printed and prior to the testing, it was decided that the items would be too difficult for the children. For this reason and because of the extreme length of the battery, the items were omitted from the test administration.

LET'S TAKE SOME TIME TO STRETCH BEFORE GOING ON.

(Allow the children two or three minutes to move about, but do not let them run around the room.)

ALL RIGHT, NOW LET'S GO BACK TO SOMETHING DIFFERENT IN THE BOOKLETS.

TURN TO THE NEXT PAGE.
(Make sure each child turns to page 13.)

Page 13 of Pupil Booklet:

(Top) (23) LOOK AT THE STORY AT THE TOP OF THE PAGE AND LISTEN TO THE STORY. THEN MARK THE NUMBER THAT ANSWERS THE QUESTION. THE STORY IS: TONY HAD SOME BLOCKS. DAVID GAVE HIM FOUR MORE BLOCKS. NOW TONY HAS SEVEN BLOCKS. HOW MANY BLOCKS DID TONY HAVE BEFORE DAVID GAVE HIM MORE? (Pause)
TONY HAD SOME BLOCKS. DAVID GAVE HIM FOUR MORE BLOCKS. NOW TONY HAS SEVEN BLOCKS. HOW MANY BLOCKS DID TONY HAVE BEFORE DAVID GAVE HIM MORE? MARK THE NUMBER THAT TELLS HOW MANY BLOCKS TONY HAD BEFORE DAVID GAVE HIM MORE. (Pause)

(Middle) (24) LOOK AT THE STORY IN THE MIDDLE OF THE PAGE AND THE NUMBERS BELOW THE STORY. LISTEN CAREFULLY WHILE I READ YOU THE STORY IN THE MIDDLE OF THE PAGE. (Pause)
JOHN HAD SOME PENNIES. HE LOST THREE OF THEM. NOW HE HAS FOUR PENNIES. HOW MANY PENNIES DID JOHN HAVE BEFORE HE LOST ANY? (Pause)
JOHN HAD SOME PENNIES. HE LOST THREE OF THEM. NOW HE HAS FOUR PENNIES. HOW MANY PENNIES DID JOHN HAVE BEFORE HE LOST ANY? MARK THE NUMBER THAT TELLS HOW MANY PENNIES JOHN HAD BEFORE HE LOST ANY. (Pause)

(Bottom) (25) LOOK AT THE STORY AND THE NUMBERS AT THE BOTTOM OF THE PAGE. NOW LISTEN TO THE STORY. (Pause) BILL HAS FIVE PENCILS. JOHN HAS THREE PENCILS. HOW MANY MORE PENCILS DOES BILL HAVE THAN JOHN? (Pause)
BILL HAS FIVE PENCILS. JOHN HAS THREE PENCILS. BILL HAS MORE PENCILS THAN JOHN. HOW MANY MORE PENCILS DOES BILL HAVE THAN JOHN? MARK THE NUMBER THAT TELLS HOW MANY MORE PENCILS BILL HAS THAN JOHN. (Pause)

TURN TO PAGE 14. (Pause) NOW FOLD YOUR BOOKLETS SO THAT YOU CAN ONLY SEE PAGE 14. (Demonstrate with your booklet while making the preceding statement. Help each child to fold pages at spine.)
(Make sure each child has page 14 showing.)

Page 14 of Pupil Booklet:

(Top) (26) LOOK AT THE STORY AND THE NUMBERS AT THE TOP OF THE PAGE. THE STORY IS: MRS. JONES BOUGHT SIX EGGS. SHE USED ONE-HALF OF THE EGGS TO MAKE A CAKE. HOW MANY EGGS DID SHE USE? (Pause)

MRS. JONES BOUGHT SIX EGGS. SHE USED ONE-HALF THE EGGS TO MAKE A CAKE. HOW MANY EGGS DID SHE USE? MARK THE NUMBER THAT TELLS HOW MANY EGGS MRS. JONES USED. (Pause)

(Middle) (27) LOOK AT THE STORY AND THE NUMBERS IN THE MIDDLE OF THE PAGE. THE STORY IS: SUE PUT FOUR ROUND COOKIES, SEVEN SQUARE COOKIES, AND FIVE LONG COOKIES IN THE COOKIE JAR. HOW MANY COOKIES IN ALL DID SHE PUT IN THE JAR? (Pause)

SUE PUT FOUR ROUND COOKIES, SEVEN SQUARE COOKIES, AND FIVE LONG COOKIES IN THE COOKIE JAR. HOW MANY COOKIES IN ALL DID SHE PUT IN THE JAR? MARK THE NUMBER THAT TELLS HOW MANY COOKIES IN ALL SUE PUT IN THE JAR. (Pause)

(Bottom) (28) LOOK AT THE STORY AND THE NUMBERS AT THE BOTTOM OF THE PAGE. THE STORY IS: BOB HAD FORTY-EIGHT MARBLES. HE TRADED TWENTY-ONE OF THEM FOR A TOY. HOW MANY MARBLES DOES HE HAVE LEFT? (Pause)

BOB HAD FORTY-EIGHT MARBLES. HE TRADED TWENTY-ONE OF THEM FOR A TOY. HOW MANY MARBLES DOES HE HAVE LEFT? MARK THE NUMBER THAT TELLS HOW MANY MARBLES BOB HAS LEFT. (Pause)

NOW TURN YOUR BOOKLETS OVER SO THAT YOU CAN SEE PAGE 15.
(Check each child to make sure he has page 15 showing.)

Page 15 of Pupil Booklet:

(Top) (29) LOOK AT THE STORY AND THE NUMBERS AT THE TOP OF THE PAGE. THE STORY IS: JIM HAD NINETEEN ACORNS. HE GAVE FIFTEEN OF THEM TO GORDON. THEN HE FOUND TWENTY-FOUR MORE ACORNS. HOW MANY ACORNS DID JIM HAVE THEN? (Pause)

JIM HAD NINETEEN ACORNS. HE GAVE FIFTEEN OF THEM TO GORDON. THEN HE FOUND TWENTY-FOUR MORE ACORNS. HOW MANY ACORNS DID JIM HAVE THEN? MARK THE NUMBER THAT TELLS HOW MANY ACORNS JIM HAD AT THE END. (Pause)

(Middle) (30) LOOK AT THE STORY IN THE MIDDLE OF THE PAGE. NOW LISTEN TO THE STORY.
JACK HAD FIFTY CENTS. HE BOUGHT A PENCIL FOR EIGHT CENTS AND A BALL FOR TEN CENTS. HOW MANY CENTS DID HE HAVE LEFT? (Pause)

JACK HAD FIFTY CENTS. HE BOUGHT A PENCIL FOR EIGHT CENTS AND A BALL FOR TEN CENTS. HOW MANY CENTS DID HE HAVE LEFT?
MARK THE NUMBER THAT SHOWS HOW MANY CENTS JACK HAD LEFT. (Pause)

TURN TO PAGE 17.
(Make certain each child turns to page 17.)

Page 17 of Pupil Booklet:

(Top) (31) LOOK AT THE PICTURE AT THE TOP OF THE PAGE. WHAT PART OF THE PICTURE IS SHADED? ONE-HALF, ONE-THIRD, OR ONE-FOURTH? (Pause)

MARK THE NUMBER THAT TELLS WHAT PART OF THE PICTURE IS SHADED: ONE-HALF, ONE-THIRD, OR ONE-FOURTH. (Pause)

(Middle) (32) LOOK AT THE PICTURE IN THE MIDDLE OF THE PAGE. WHAT PART OF THE LINE IS SHADED? ONE-THIRD, ONE-FOURTH, OR ONE-FIFTH? (Pause)

MARK THE NUMBER THAT TELLS WHAT PART OF THE LINE IS SHADED: ONE-THIRD, ONE-FOURTH, OR ONE-FIFTH. (Pause)

(Bottom) (33) LOOK AT THE PICTURE AT THE BOTTOM OF THE PAGE. WHAT NUMBER GOES BEST WITH THE PICTURE? ONE-THIRD, TWO-THIRDS, OR THREE-FOURTHS. (Pause)

MARK THE NUMBER THAT TELLS WHAT PART OF THE PICTURE IS <u>SHADED</u>. ONE-THIRD, TWO-THIRDS, OR THREE-FOURTHS. (Pause)

TURN TO PAGE 18.
(Make certain each child turns to <u>page 18</u>.)

Page 18 of Pupil Booklet:

(Top) (34) LOOK AT THE PICTURE AT THE TOP OF THE PAGE.
WHAT PART OF THE STRING IS SHADED?
ONE-HALF, ONE-THIRD, OR ONE-FOURTH? (Pause)

MARK THE NUMBER THAT TELLS WHAT PART OF THE STRING IS SHADED: ONE-HALF, ONE-THIRD, OR ONE-FOURTH. (Pause)

(Middle) (35) LOOK AT THE PICTURE IN THE MIDDLE OF THE PAGE.
WHAT PART OF THE CIRCLE IS SHADED?
ONE-THIRD, ONE-HALF, OR ONE-FOURTH? (Pause)

MARK THE NUMBER THAT TELLS WHAT PART OF THE CIRLE IS SHADED: ONE-THIRD, ONE-HALF, OR ONE-FOURTH. (Pause)

(Bottom) (36) LOOK AT THE DOTS AT THE BOTTOM OF THE PAGE.
DRAW A RING AROUND ONE-THIRD OF THE DOTS. (Pause)

DRAW A RING AROUND ONE-THIRD OF THE DOTS. (Pause)

TURN YOUR BOOKLETS OVER SO THAT YOU CAN SEE PAGE 19.

Page 19 of Pupil Booklet:

(Top) (37) LOOK AT THE PICTURES AT THE TOP OF THE PAGE. WHICH SET HAS ONE-HALF SHADED? (Pause)

MARK THE SET WITH ONE-HALF OF IT SHADED. (Pause)

(Middle) (38) LOOK AT THE NUMBERS IN THE MIDDLE OF THE PAGE AND LISTEN TO THE QUESTION.

WHEN SOMETHING IS CUT IN FOURTHS, HOW MANY PIECES ARE THERE? (Pause)

WHEN SOMETHING IS CUT IN FOURTHS, HOW MANY PIECES ARE THERE? MARK THE NUMBER THAT TELLS HOW MANY PIECES. (Pause)

TURN TO PAGE 21.

Page 21 of Pupil Booklet:

THIS PAGE IS FOR PRACTICE.

(Practice Item) HERE ARE THREE SETS OF CLOCKS. YOU ARE TO SHOW HOW THEY GO IN ORDER FROM THE SET WITH THE FEWEST CLOCKS TO THE SET WITH THE MOST CLOCKS. PUT THE NUMBERS "1", "2", OR "3" IN THE BOXES NEXT TO THE SETS TO SHOW THE ORDER. PUT A "1" IN THE BOX NEXT TO THE SET WITH THE FEWEST CLOCKS. PUT A "3" IN THE BOX NEXT TO THE SET THAT HAS THE MOST CLOCKS. PUT A "2" IN THE BOX NEXT TO THE SET THAT WOULD COME IN BETWEEN THE OTHER TWO SETS. (Pause)

WRITE NUMBERS IN THE BOXES TO SHOW HOW THE SETS OF CLOCKS SHOULD GO IN ORDER. PUT "1" FOR THE SET WITH THE FEWEST CLOCKS. WRITE "2" FOR THE SET THAT WOULD COME IN THE MIDDLE. WRITE "3" FOR THE SET WITH THE MOST CLOCKS. (Pause)

THE SET OF CLOCKS AT THE TOP OF THE PAGE COMES BETWEEN THE OTHER SETS IN ORDER. THE NUMBER "2" GOES IN THE BOX ON THE TOP OF THE PAGE. WRITE A "2" IN THE BOX AT THE TOP OF THE PAGE IF YOU DON'T HAVE A "2" THERE ALREADY.

(Children may erase or cross out their wrong answers.)

THE SET IN THE MIDDLE OF THE PAGE HAS THE MOST CLOCKS. THE NUMBER "3" GOES IN THE BOX IN THE MIDDLE OF THE PAGE BECAUSE IT IS THE SET WITH THE MOST CLOCKS. WRITE THE NUMBER "3" IN THE BOX IN THE MIDDLE OF THE PAGE IF YOU HAVEN'T ALREADY DONE SO.
THE SET ON THE BOTTOM OF THE PAGE HAS THE FEWEST CLOCKS. THE NUMBER "1" GOES IN THE BOX AT THE BOTTOM OF THE PAGE. (Pause)

NOW YOU ARE GOING TO SHOW HOW SOME MORE SETS CAN BE ARRANGED IN ORDER. TURN TO PAGE 23.

Page 23 of Pupil Booklet:

(39) HERE ARE FOUR SETS OF FLOWER POTS. SHOW HOW THEY GO IN ORDER FROM THE SET WITH THE FEWEST FLOWER POTS TO THE SET WITH THE MOST FLOWER POTS. USE THE NUMBERS "1", "2", "3", AND "4" TO SHOW THE ORDER. PUT A "1" IN THE BOX NEXT TO THE SET WITH THE FEWEST FLOWER POTS. PUT A "4" NEXT TO THE SET WITH THE MOST FLOWER POTS. PUT A "1", "2", "3", OR "4" IN THE BOXES FOR EACH OF THE FOUR SETS.

(Pause, allowing enough time so that children who are putting numbers in the boxes can fill in the three boxes.)

Then say:

PUT THE NUMBERS "1", "2", "3", AND "4" IN THE BOXES TO SHOW HOW THE SETS OF FLOWER POTS GO IN ORDER. USE "1" FOR THE SET WITH THE FEWEST FLOWER POTS.
(Pause)

TURN TO PAGE 24.
(Make certain each child turns to page 24.)

Page 24 of Pupil Booklet:

(40) HERE ARE FOUR SETS OF BOTTLES. USE THE NUMBERS "1", "2", "3", AND "4" TO SHOW HOW THEY GO IN ORDER. USE "1" FOR THE SET WITH THE FEWEST BOTTLES. USE "4" FOR THE SET WITH THE MOST BOTTLES. PUT A NUMBER IN EACH BOX.

(Pause, allowing time for children who have started task to fill in the boxes.)

Then say:

PUT THE NUMBERS "1", "2", "3", AND "4" IN THE BOXES TO SHOW HOW THE SETS OF BOTTLES GO IN ORDER. USE "1" FOR THE SET WITH THE FEWEST BOTTLES. (Pause)

TURN YOUR BOOKLETS OVER SO THAT YOU CAN SEE PAGE 25.

Page 25 of Pupil Booklet:

(41) HERE ARE FOUR SETS OF BALLS. USE THE NUMBERS "1", "2", "3", AND "4" TO SHOW HOW THEY GO IN ORDER. USE "1" FOR THE SET WITH THE FEWEST BALLS AND "4" FOR THE SET WITH THE MOST BALLS. PUT A NUMBER IN EACH BOX. (Pause)

PUT THE NUMBERS "1", "2", "3", AND "4" IN THE BOXES TO SHOW HOW THE SETS OF BALLS GO IN ORDER. USE "1" FOR THE SET WITH THE FEWEST BALLS. (Pause)

TURN TO PAGE 27.

Page 27 of Pupil Booklet:

(42) HOW MANY CIRCLES ARE ON THIS PAGE?
WRITE THE NUMBER IN THE BOX. (Pause)

COUNT ALL THE CIRCLES, AND WRITE THE NUMBER IN THE BOX. (Pause)

TURN TO PAGE 29.

Page 29 of Pupil Booklet:

(43) HOW MANY CIRCLES ARE ON THIS PAGE?
WRITE THE NUMBER IN THE BOX. (Pause)

COUNT ALL THE CIRCLES, AND WRITE THE NUMBER
IN THE BOX.

SCHOOL
MATHEMATICS
STUDY GROUP

FORM 2-04

Name of tester_____

Date test given_____

Cedar Hall, Stanford University
Stanford, California

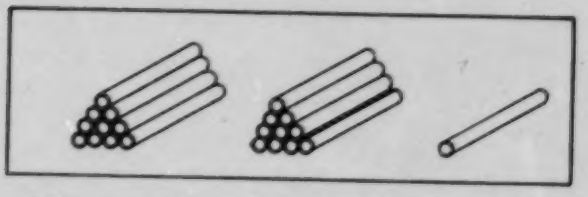
(1) Which number has a five in the tens place?

15 5 51

28

(2) Which number shows how many tens?

(3)



Look at the picture. How many tens are there?

37

(4) Which number is in the ones place?

(5) Which number is three hundred three?

3003	330	303

(6) Write a number in the box to make the sentence true.

125 = 100 + ☐ + 5

(7) Which of these is a name for ten tens?

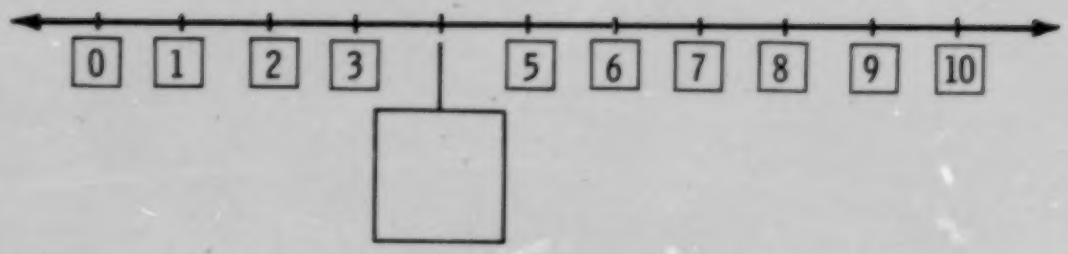
100 110 1010

(8) Which of these is a name for six tens and thirteen ones?

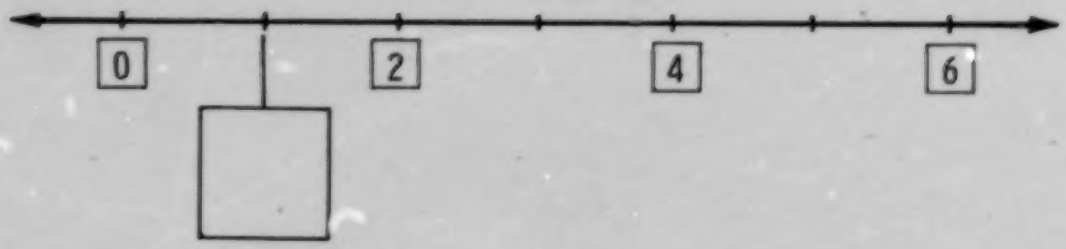
613 73 19

WHAT NUMBERS GO IN THE EMPTY BOXES?

(9)

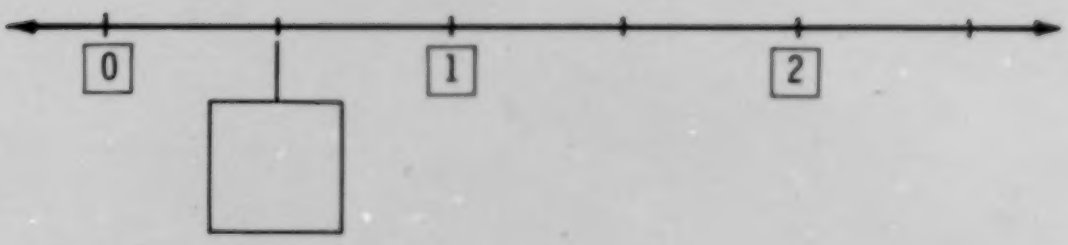


(10)

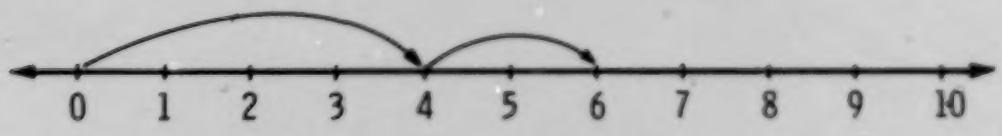


(11)

(12) Which number goes in the empty box?



(13) Which number sentence do these arrows show?

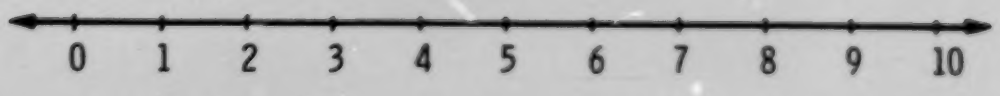


6 + 2 = 4

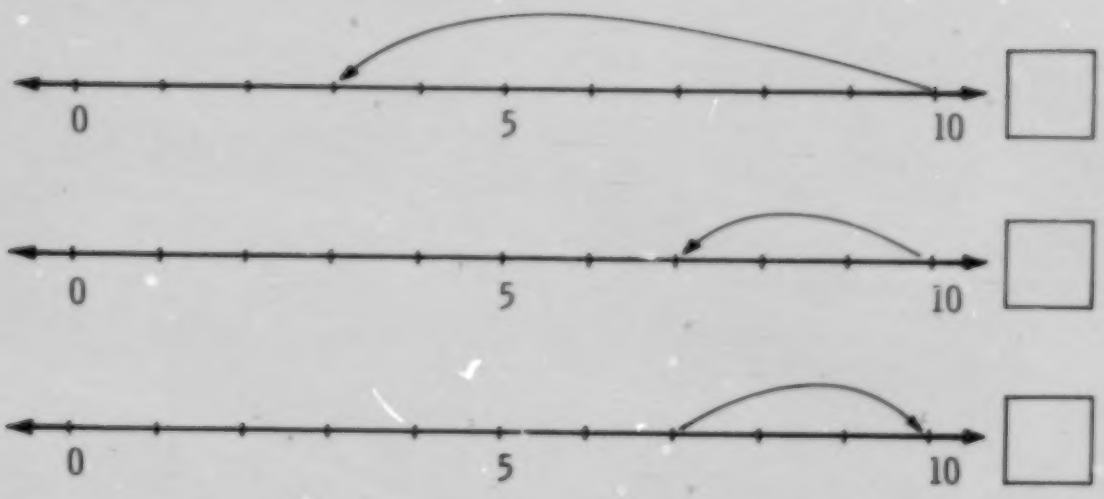
4 + 2 = 6

2 + 4 = 6

(14) Draw arrows to show 3 + 5 = 8.



(15) Which picture goes with 10 - 7 - 3 ?



Items 16-22 are not reproduced in this report. After the booklets had been printed and prior to the testing, it was decided that the items would be too difficult for the children. For this reason and because of the extreme length of the battery, the items were omitted from the test administration.

(23) Tony had some blocks. David gave him four more blocks. Now Tony has seven blocks. How many blocks did Tony have before David gave him more?

3	4	5	6

(24) John had some pennies. He lost three of them. Now he has four pennies. How many pennies did John have before he lost any?

3	5	7	4

(25) Bill has five pencils. John has three pencils. How many more pencils does Bill have than John?

1	3	5	2

(26) Mrs. Jones bought six eggs. She used one-half of the eggs to make a cake. How many eggs did she use?

2	3	4

(27) Sue put 4 round cookies, 7 square cookies, and 5 long cookies in the cookie jar. How many cookies in all did she put in the jar?

11	12	15	16

(28) Bob had 48 marbles. He traded 21 of them for a toy. How many marbles does he have left?

27	29	67	69

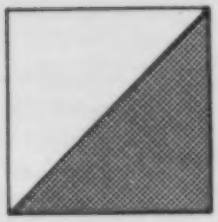
(29) Jim had 19 acorns. He gave 15 of them to Gordon. Then he found 24 more acorns. How many acorns did Jim have then?

4	28	38	58

(30) Jack had fifty cents. He bought a pencil for eight cents and a ball for ten cents. How many cents did he have left?

32	38	42	48

(31) What part of the picture is shaded?



$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

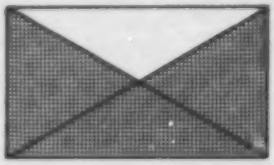
---

(32) What part of the line is shaded?

$\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$

---

(33) What number goes best with the picture?



$\frac{1}{3}$ $\frac{2}{3}$ $\frac{3}{4}$

(34) What part of the string is shaded?

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

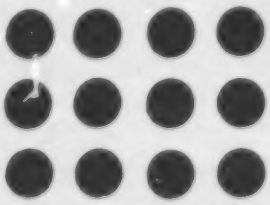
---

(35) What part of the circle is shaded?

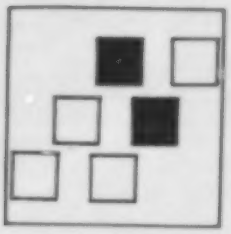
$\frac{1}{3}$ $\frac{1}{2}$ $\frac{1}{4}$

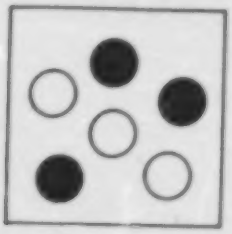
---

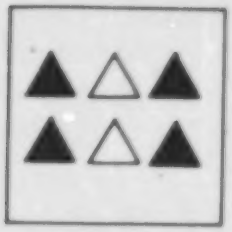
(36) Draw a ring around one-third of the dots.



(37) Which set has one-half shaded?







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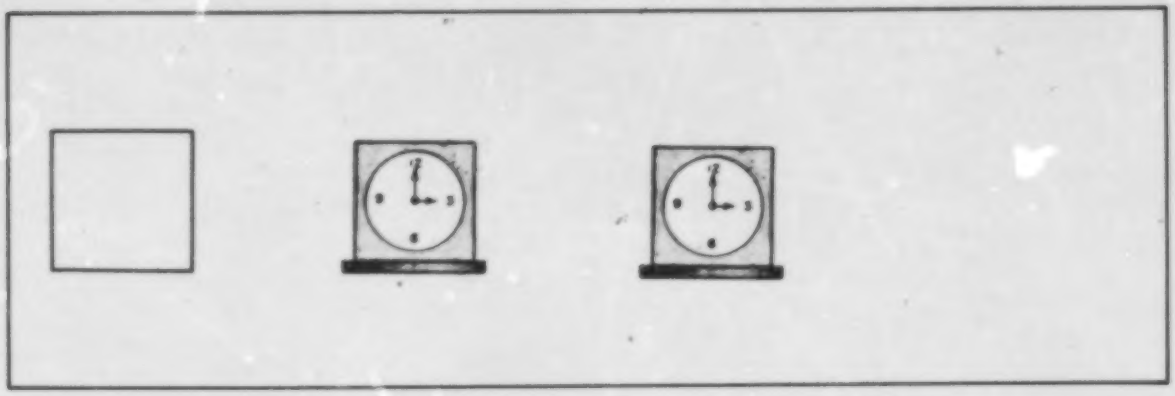
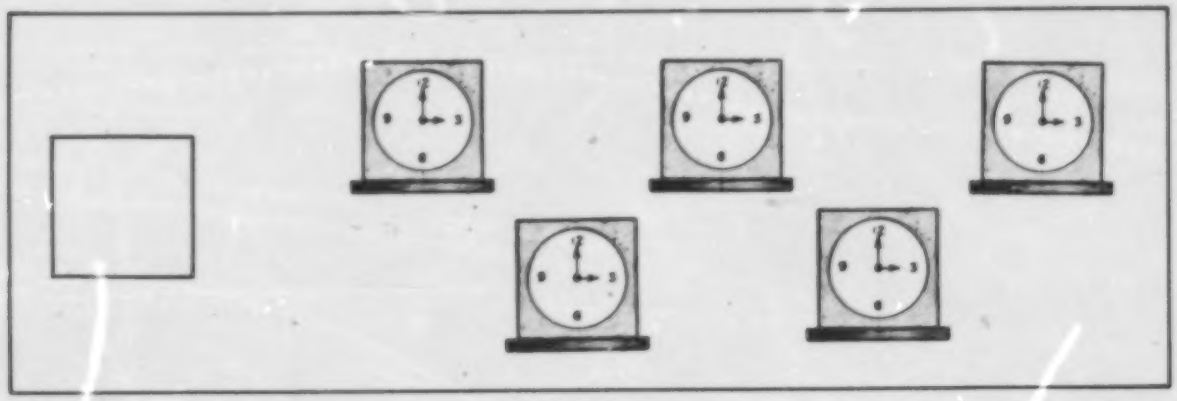
(38) When something is cut in fourths, how many pieces are there?

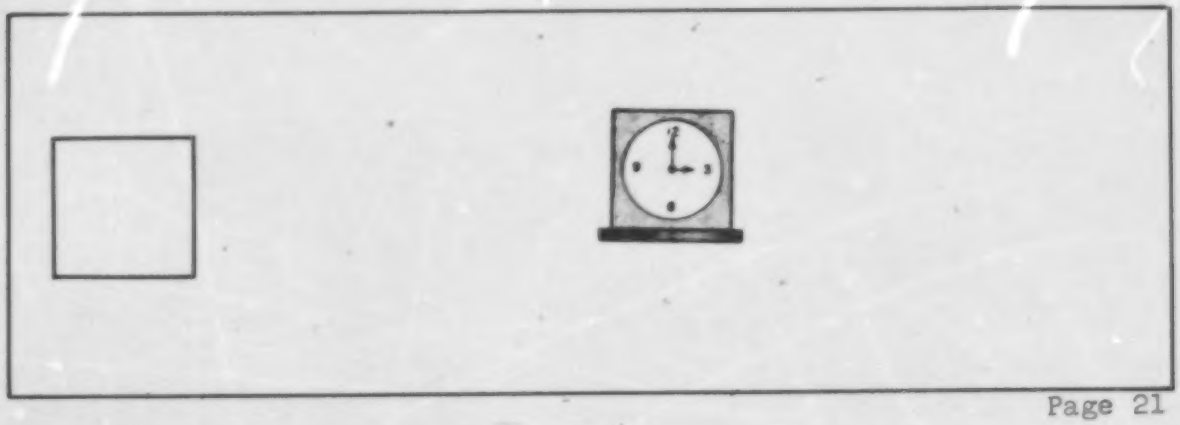
2	3	4	5

Practice Item

Here are three sets of clocks. You are to show how they go in order from the set with the fewest clocks to the set with the most clocks. Put the numbers "1", "2", or "3" in the boxes next to the sets to show the order. Put a "1" in the box next to the set with the fewest clocks. Put a "3" in the box next to the set that has the most clocks. Put a "2" in the box next to the set that would come in between the other two sets.

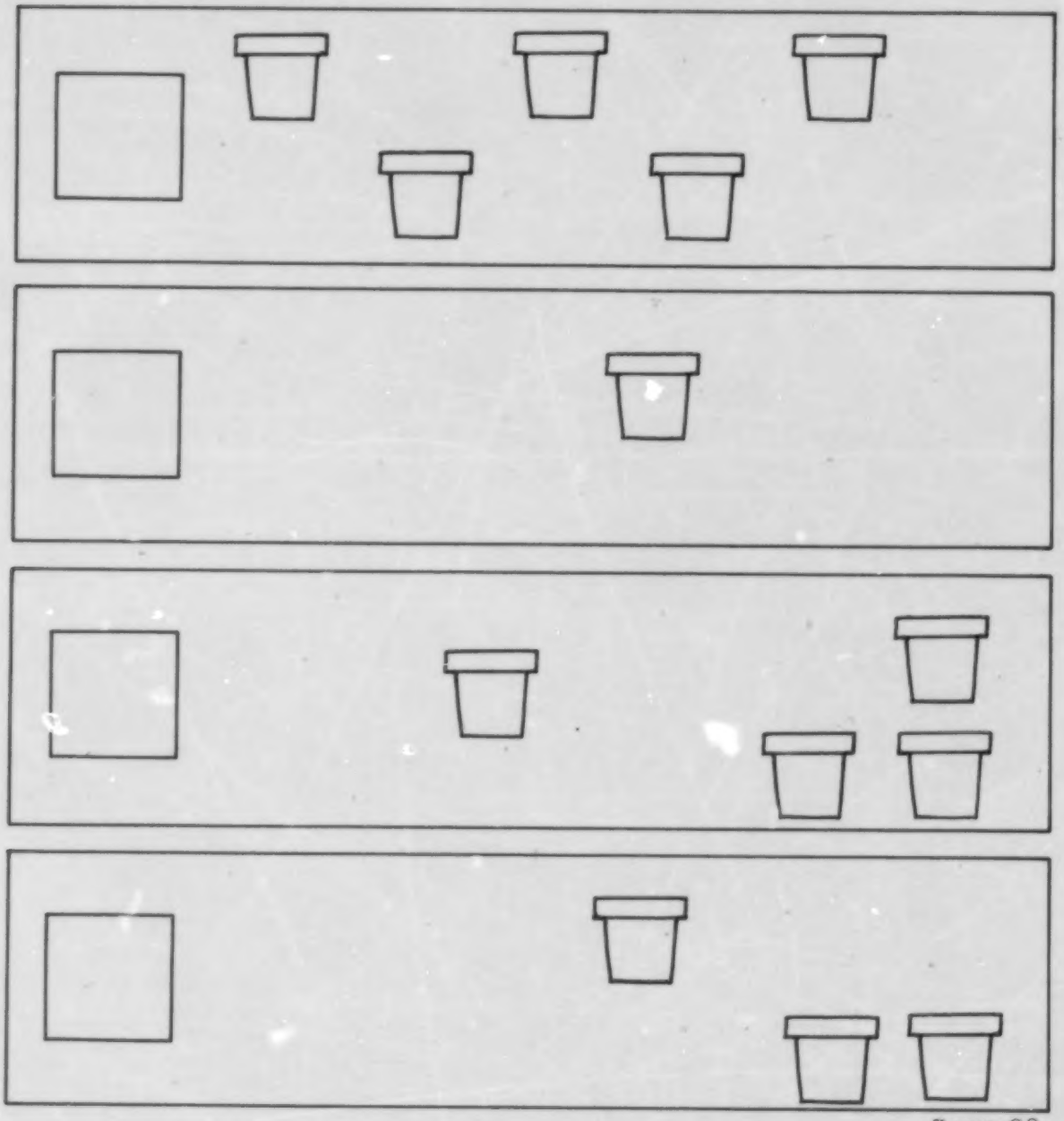




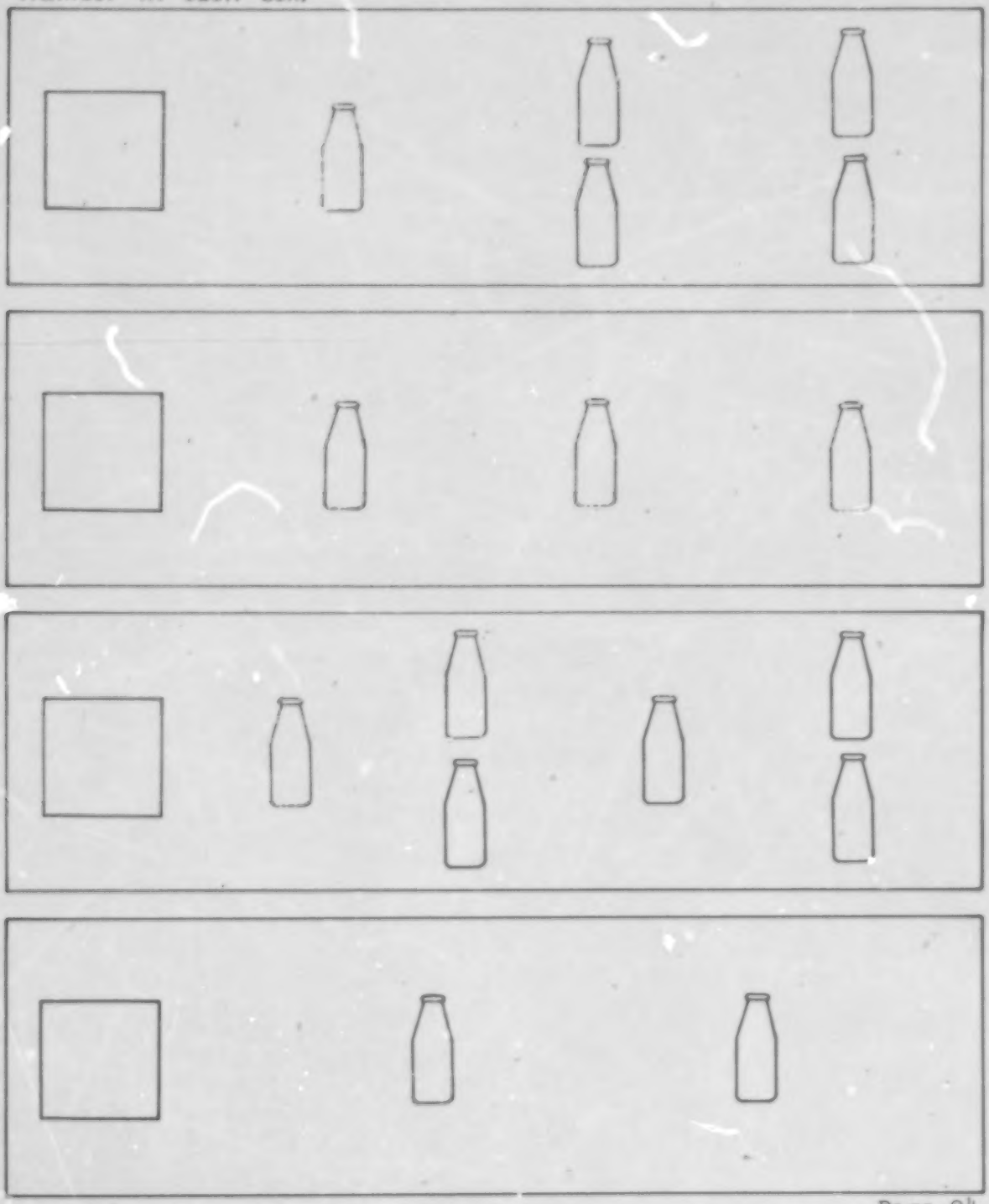


(39)

Here are four sets of flower pots. Show how they go in order from the set with the fewest flower pots to the set with the most flower pots. Use the numbers "1", "2", "3", and "4" to show the order. Put a "1" in the box next to the set with the fewest flower pots. Put a "4" next to the set with the most flower pots. Put a "1", "2", "3", or "4" in the boxes for each of the four sets.

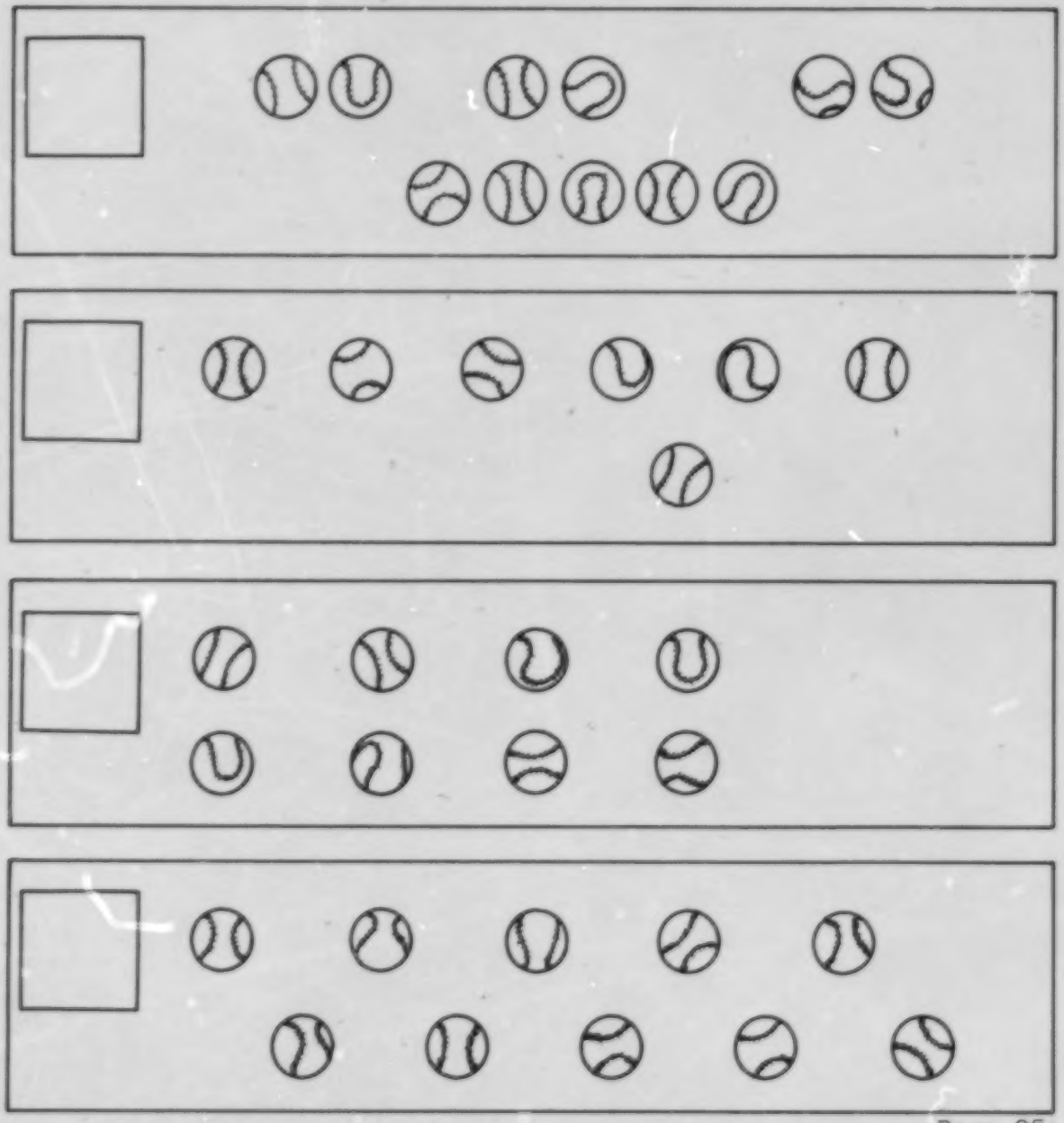


(40) Here are four sets of bottles. Use the numbers "1", "2", "3", and "4" to show how they go in order. Use "1" for the set with the fewest bottles. Use "4" for the set with the most bottles. Put a number in each box.



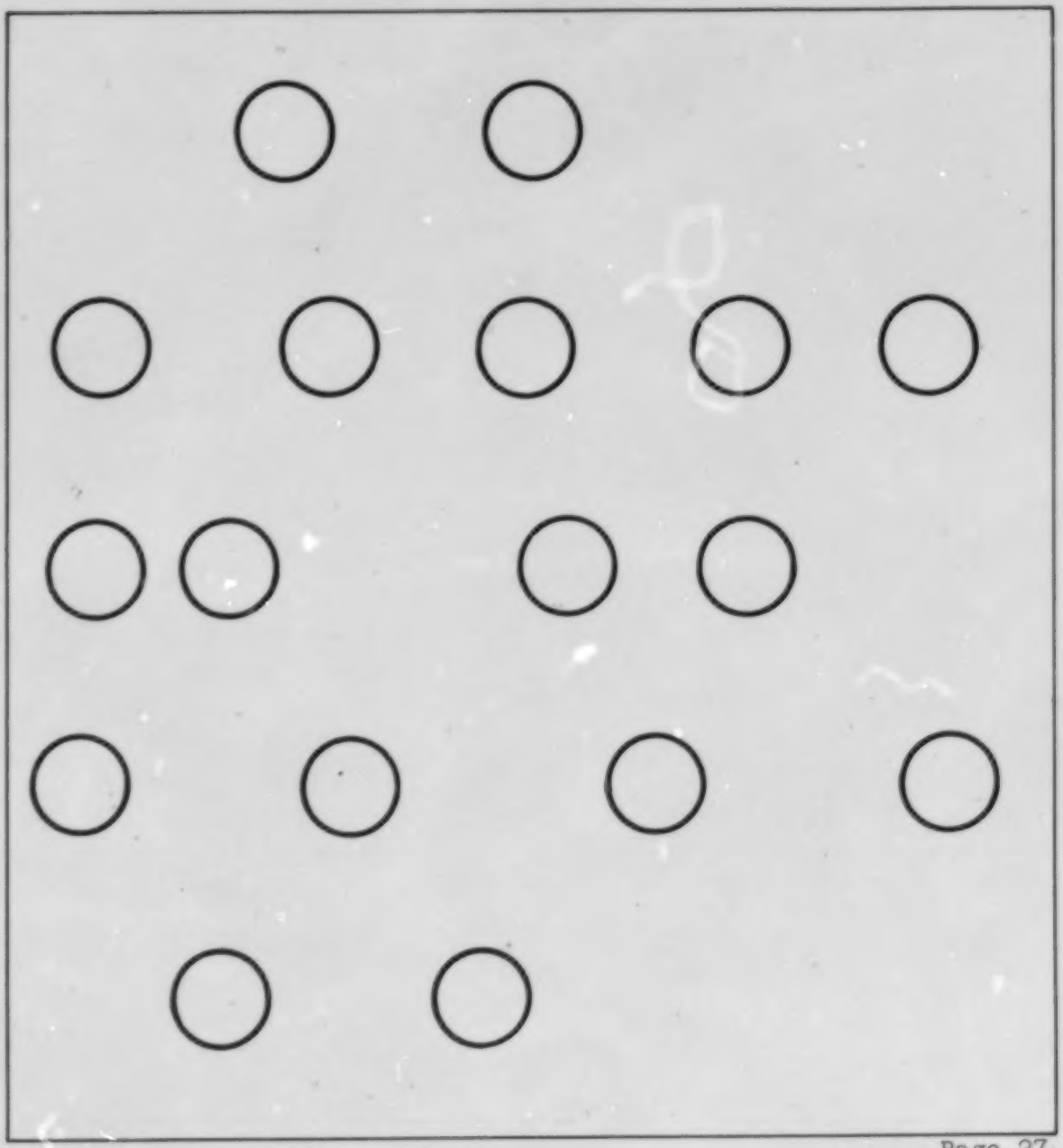
(41)

Here are four sets of balls. Use the numbers "1", "2", "3", and "4" to show how they go in order. Use "1" for the set with the fewest balls and "4" for the set with the most balls. Put a number in each box.



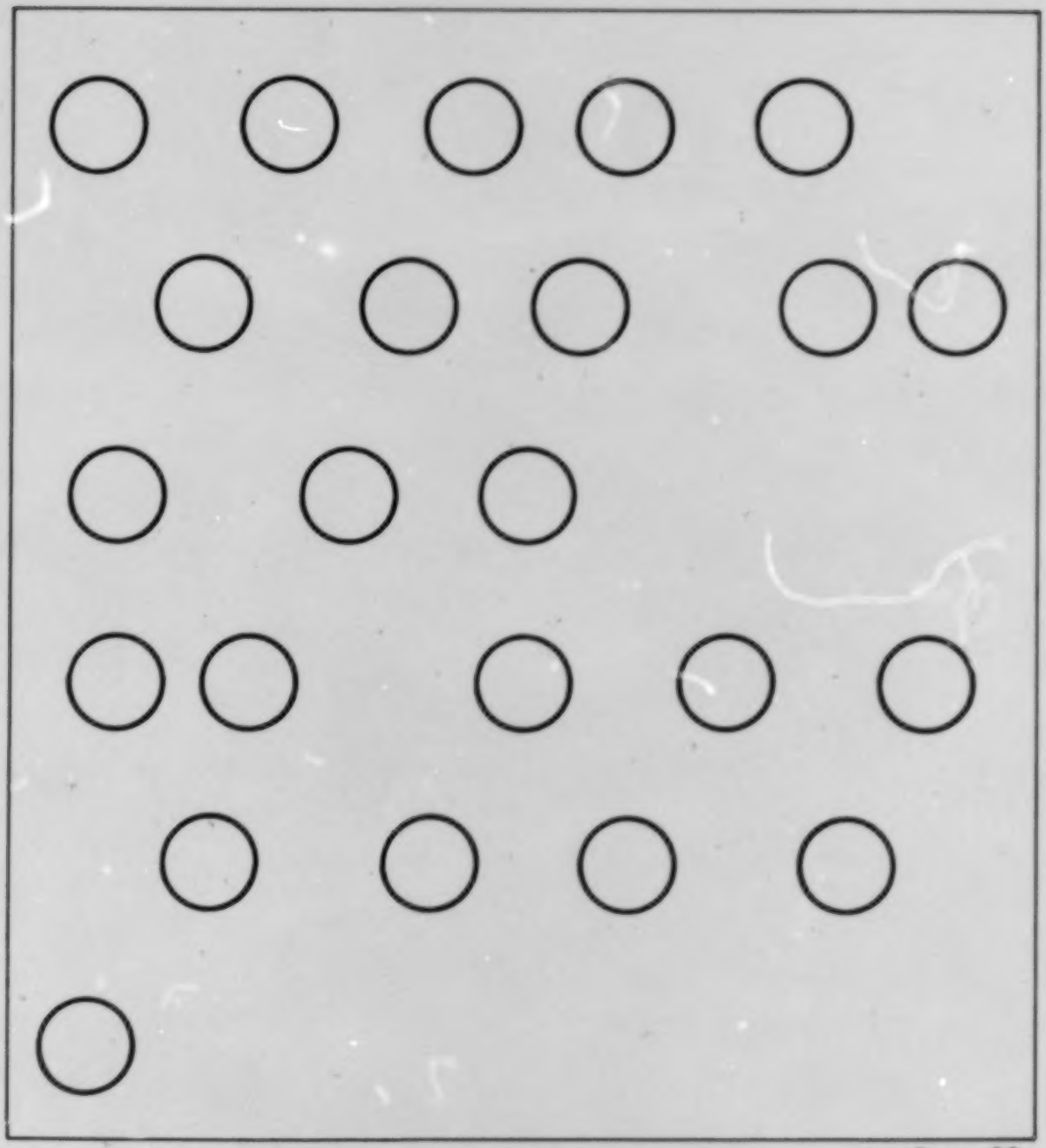
(42) How many circles are there on this page?

Write the number in the box.



(43) How many circles are on this page?

Write the number in the box.



SCHOOL MATHEMATICS STUDY GROUP

Elementary Mathematics Project

INSTRUCTIONS FOR FORM 2-05

GENERAL TESTING INSTRUCTIONS

1. Setting for Administration of Tests

It is important to have a separate room so that interruptions and distractions are minimized Seating arrangements for the children should minimize one child's distracting another; maximize independent work; and facilitate monitoring all children in the group.

2. Procedure

In general, administer this test to five children in a group. In no instance is the test given to a group larger than six. In selecting a group for testing, try to minimize disruption of classroom activity.

The atmosphere should be as anxiety-free as possible. Set the tone by talking to the children as they enter the examination room and are being seated at prearranged desks. If the children seem anxious, assure them that we are interested in what they are learning in school, but what they do will in no way affect their grades.

3. General Directions for Test Administration

This manual includes all instructions that are to be read to the children. What you actually say to the child is typed in capital letters. The instructions for you, as tester, are typed in lower case. Read all the sentences (written in capital letters) to the children as they are written. Directions are to be read slowly and distinctly as the tester circulates among

the children. Make sure that all children are on the correct page before beginning instructions for that page.

If a child indicates that he does not know an answer, say: "MARK THE ANSWER YOU THINK IS RIGHT." However, do not insist that the child make a response. Do reassure him that there may be questions on material not yet covered in class, but give no further hints.

In the event a child wants to change his response, make sure he has erased the original response before marking another.

If a child talks during testing, you are to remind him reassuringly that he is not to talk; that you will know which answer he thought was the correct one when you look at his booklet.

4. Important Considerations

a) Do not change wording on any item.

b) Monitor the children by walking around and making certain that each child understands the instructions.

c) On each answer booklet, fill in your name and date of testing.

d) At the end of each day of testing, record on your Time Sheet the number of group tests you have administered and the hours worked that day. It is essential that we have this information before payment can be made.

SPECIFIC TESTING INSTRUCTIONS

1. Form 2-05 has four items which require instructions to be read by the tester. These items are on the first four pages (3-6) of the child's booklet. The remainder of the items are to be done by the children themselves without any reading of instructions for separate items.

2. The tester's manual for Form 2-05 begins with instructions for the four pages of the pupil booklet that are to be read to the children. The sentences on these pages are to be read to the children exactly as they are written. Children are not to turn the page until you tell them to do so. Watch children to be sure that all are on the page corresponding to the one that is to be read. Following these four pages, there is a page of instructions that is to be read to the children before they do the remainder of the test, which is the computation section of the test. The computational tasks are to be completed at the child's own rate. Those children who finish first will be given extra pages with an activity to occupy them until the rest of the children have finished. The slower children will also be given these activity pages when testing has been completed. All children can keep these pages. (This activity only serves to keep the fast children from disturbing the slower children.)

3. Do not require children to work examples with which they are unfamiliar. Reassure them that there may be pages or questions which they have not yet covered in class. (There will probably be quite a few children who have not learned to work with three-digit numbers. Also, multiplication may have been taught in only some of the schools.)

4. Page 3 of the pupil booklet is a sample page. It is designed to orient the child to the format of the following three items to which he is to make multiple responses. Do not tell the child whether his answer is correct. The sample page is used only to teach the child the method of marking his answers in his booklet.

Say: I AM GOING TO READ SOME SENTENCES TO YOU. YOU ARE TO DO WHAT THE SENTENCES TELL YOU TO DO BY MAKING MARKS ON YOUR BOOKLETS. DO YOU KNOW WHAT MARK MEANS? (Pause for responses and reinforce those responses offered by children. They may use any system of marking that is familiar to them, i.e., circle, cross, ex, underline, etc.) YES, DO WHAT THE SENTENCES TELL YOU TO DO BY

MAKING MARKS ON YOUR BOOKLETS. DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO. ARE YOU READY?

(Take time to answer any questions that might arise.)

NOW, OPEN YOUR BOOKLETS. (Make sure each child is on Page 3.)
LISTEN CAREFULLY AS I READ WHAT YOU ARE TO DO.

Page 3. LOOK AT THE PICTURES ON THIS PAGE, AND MARK ALL THE CIRCLES. (Pause) LOOK AT ALL THE FIGURES, AND MARK ALL THE CIRCLES. (Pause for the children to make their responses, If some children indicate that they do not know which figures are circles, say: MARK THOSE YOU THINK ARE CIRCLES. You are to give no further hints, and at no time are you to name any other shapes on the page.)

TURN TO THE NEXT PAGE. (Make sure all children turn to Page 4.)

Page 4. LOOK AT THE PICTURES ON THIS PAGE. MARK ALL THE POLYGONS. (Pause) LOOK AT ALL THE SHAPES AND MARK ALL THE POLYGONS. (Pause for the children to make their responses. Give no hints other than MARK THE ONES YOU THINK ARE POLYGONS.)

TURN TO THE NEXT PAGE. (Make sure all children turn to Page 5.)

Page 5. LOOK AT THE PICTURES ON THIS PAGE. MARK ALL THE TRIANGLES. (Pause) LOOK AT ALL THE FIGURES, AND MARK ALL THE TRIANGLES. (Pause for the children to make their responses. Give no hints other than MARK THOSE YOU THINK ARE TRIANGLES.)

TURN TO THE NEXT PAGE. (Make sure all children turn to Page 6.)

Page 6. PUT YOUR FINGER ON THE PICTURE ABOVE THE LINE. (Make sure all children are pointing to the correct figure before continuing.) LOOK AT THIS FIGURE. (Point to figure.) NOW,

MARK ALL THE FIGURES BELOW THE LINE THAT ARE CONGRUENT TO IT. (Pause) MARK ALL THE FIGURES BELOW THE LINE THAT ARE CONGRUENT TO THE FIGURE ABOVE THE LINE. (The children may not know the word "congruent"; however, give no hint other than MARK THE SHAPES YOU THINK ARE CONGRUENT TO THE FIGURE ABOVE THE LINE. (Pause while the children mark their responses.) DO NOT TURN TO THE NEXT PAGE YET.

Pages 7-12. PUT YOU PENCILS DOWN AND LOOK THIS WAY. (Get attention of all pupils before continuing. Hold the manual so that the page of symbols (+, -, ×) is visible to all children.) YOU ARE GOING TO WORK THE REST OF THE BOOKLET BY YOURSELVES. (Point to each of the signs, "+, -, X," while saying...) WATCH FOR THESE SIGNS; THEY TELL YOU WHAT TO DO TO FIND THE MISSING NUMBER IN EACH EXAMPLE. IF YOU NEED THINGS TO COUNT, USE YOUR FINGERS OR MAKE MARKS ON THE PAGE.

YOU MAY NOT HAVE BEEN TAUGHT HOW TO WORK SOME EXAMPLES. IF YOU COME TO AN EXAMPLE YOU DON'T KNOW HOW TO DO, GO ON TO THE NEXT ONE. WORK ALL THE EXAMPLES YOU KNOW HOW TO DO. WHEN YOU FINISH ONE PAGE, TURN TO THE NEXT. ARE THERE ANY QUESTIONS? (If there are questions, repeat any of the above instructions appropriate to the questions.)

REMEMBER, (point to symbols again) WATCH FOR THESE SIGNS, AND WORK ALL THE EXAMPLES YOU KNOW HOW TO DO. NOW, TURN TO THE NEXT PAGE IN YOUR BOOKLET AND BEGIN.

You are to circulate among the children as they work the computation examples. If any questions arise, you may repeat any of the above instructions. No further hints are to be given. Remind the pupils to continue working until they have completed the booklets.

In order to keep the children who may finish early from disturbing those who are still working, we have provided you with some activity pages. You should carry them with you as you circulate among the children. When a child has finished his answer booklet, and you have checked to see that he has completed it, remove his booklet and give him the

activity pages. These activities, hopefully, will keep the faster children occupied while slower workers complete their booklets. The children may keep these pages. Slower children should be given a set of activity pages to take with them after they have completed their booklets.

+ − ×

SCHOOL
MATHEMATICS
STUDY GROUP

FORM 2-05

Name of tester _____

Date test given _____

Cedar Hall, Stanford University
Stanford, California

MARK ALL THE CIRCLES

Sample Page

Grade 2
Spring

186

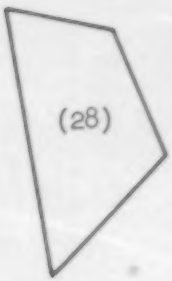
260

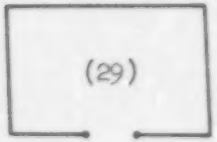
3

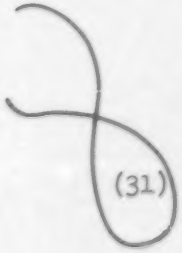
Form 2-05
Sample Page

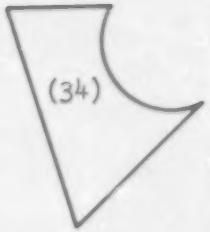
261

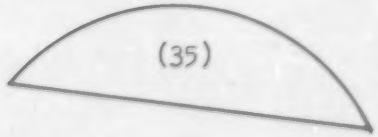
MARK ALL THE POLYGONS

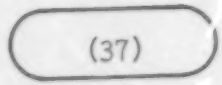


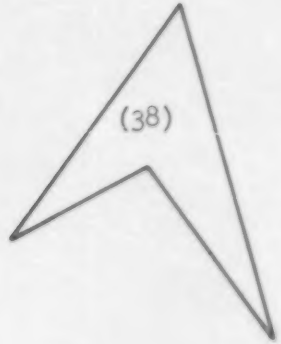


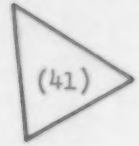


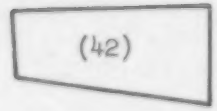


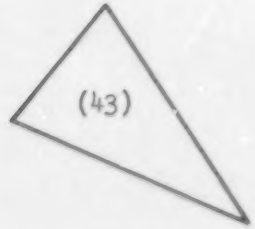






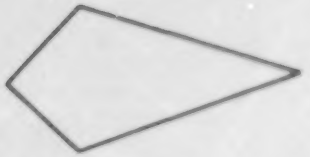


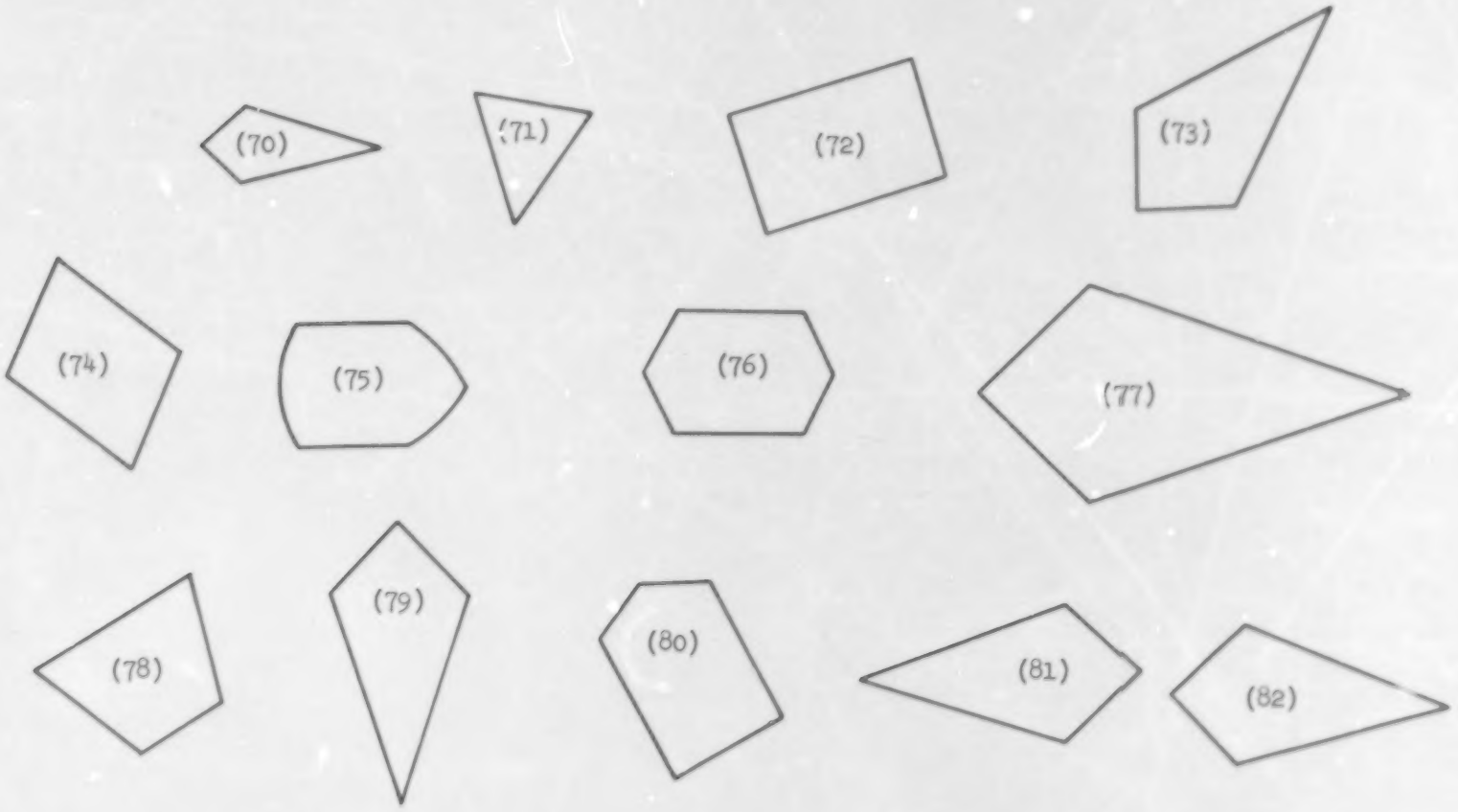




MARK ALL THE TRIANGLES.

Look at this figure. Now, mark all the figures below the line that are congruent to it.





189

6(3)

FIND THE SUMS

(4)

9 + 2 = _____

(5)

50 + 40 = _____

(6)

$$\begin{array}{r} 42 \\ +\ 23 \\ \hline \end{array}$$

(7)

7 + 7 = _____

FIND THE SUMS

(8)

$6 + 1 + 0 + 7 =$ _____

(9)

$$\begin{array}{r} 340 \\ +\ 277 \\ \hline \end{array}$$

(10)

$9 + 19 =$ _____

(11)

$10 + 43 + 31 =$ _____

191

8(8-11)

Grade 2
Spring

Form 2-05
Items 8-11

FIND THE DIFFERENCES

(12)

6 - 0 = _____

(13)

80 - 20 = _____

(14)

$$\begin{array}{r} 76 \\ -\ 24 \\ \hline \end{array}$$

(15)

13 - 5 = _____

FIND THE DIFFERENCES

(16)

10 - 6 = _____

(17)

82 - 45 = _____

193

(18)

633
- 40

(19)

11 - 3 = _____

10(16-19)

FIND THE PRODUCTS

(20)

$2 \times 3 =$ _____

(21)

$3 \times 4 =$ _____

(22)

$1 \times 12 =$ _____

(23)

$8 \times 6 =$ _____

FIND THE PRODUCTS

(24)

$3 \times 7 =$ _____

(25)

$10 \times 8 =$ _____

(26)

$$\begin{array}{r} 34 \\ \times\ 2 \\ \hline \end{array}$$

(27)

$9 \times 0 =$ _____

DESCRIPTION AND STATISTICAL PROPERTIES

OF SCALES - FALL

SCORING THE GRADE 2 FALL SCALES

For all the scales in the fall testing, the items were scored as follows:

correct response

incorrect or
multiple response

non-attempt.

The actual scale score used in calculating the statistics in this report is the sum of correct responses for all items within the scale.

401 NUMBER COMPARISON - ORDER (7 items; 1/4 of population)

The items in this scale are designed to assess the pupil's understanding of numerical order. The pupil is required to identify numerals or sets of dots which best illustrate the fundamental concepts of "largest," "fewer than," "between," "more than," "greatest," and "least." It is the same as 307 and is an extension of 406 and 410.

The items which make up this scale come from Form 2-01 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 1 - 7 Pages 35 - 39

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	7
MEAN TOTAL SCORE	=	5.812
STANDARD DEVIATION	=	1.280
CRONBACH'S ALPHA	=	0.512
ERROR OF MEASUREMENT	=	0.894

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
1	0.896	0.900	0.318	0.385
2	0.788	0.788	0.272	0.0
3	0.727	0.753	0.386	3.462
4	0.669	0.696	0.383	3.846
5	0.973	0.981	0.290	0.769
6	0.888	0.888	0.489	0.0
7	0.869	0.869	0.621	0.0

402 PLACE VALUE (8 items; 1/4 of population)

This scale is designed to measure the pupil's ability to interpret the meaning of symbols in the numeration system. The items are of three general types: identification of digits in the ones or tens place; identification of a numeral in terms of its numerical description; interpretation of a numeral in terms of a pictorial display and vice versa. This scale consists of five multiple choice items and three items requiring constructed responses. It is the same as 306 and is an extension of 407.

The items which make up this scale come from Form 2-01 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 8 - 15 Pages 40 - 46

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.531
STANDARD DEVIATION	=	2.050
CRONBACH'S ALPHA	=	0.690
ERROR OF MEASUREMENT	=	1.142

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
8	0.265	0.273	0.223	2.692
9	0.777	0.815	0.279	4.615
10	0.354	0.390	0.702	9.231
11	0.738	0.750	0.612	1.538
12	0.796	0.805	0.579	1.154
13	0.612	0.665	0.432	8.077
14	0.604	0.616	0.549	1.923
15	0.385	0.400	0.642	3.846

403 COMPREHENSION (GROUP) (4 items; 1/4 of population)

This scale is designed to measure the pupil's understanding of several basic mathematical concepts. The items were administered in booklet form (multiple choice format) to small groups of children. Each of these items is constructed to test a difference concept: the commutative property of addition; a definition of fractions; an interpretation of subtraction in terms of set partitioning, and multiplication in terms of arrays. The scale is the same as 328.

The items which make up this scale come from Form 2-01 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 16 - 18, 26 Pages 47, 48, 53

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	1.842
STANDARD DEVIATION	=	1.057
CRONBACH'S ALPHA	=	0.288
ERROR OF MEASUREMENT	=	0.892

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
16	0.519	0.553	0.184	6.154
17	0.169	0.175	0.167	3.462
18	0.542	0.547	0.277	0.769
26	0.612	0.624	0.139	1.923

404 APPLICATION (7 items; 1/4 of population)

This scale is composed of seven story problems which are designed to measure the pupil's ability to select and perform the relevant arithmetic operations. Six of the items involve either addition or subtraction, while the seventh deals with partitioning a set into two equivalent groups. The format for all the items in this scale is multiple choice. It is the same as 309 and is an extension of 408 and 411.

The items which make up this scale come from Form 2-01 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 19 - 25 Pages 49 - 52

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	7
MEAN TOTAL SCORE	=	4.800
STANDARD DEVIATION	=	1.643
CRONBACH'S ALPHA	=	0.611
ERROR OF MEASUREMENT	=	1.025

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
19	0.869	0.883	0.412	1.538
20	0.842	0.849	0.579	0.769
21	0.938	0.942	0.418	0.385
22	0.519	0.538	0.450	3.462
23	0.631	0.638	0.450	1.154
24	0.515	0.540	0.472	4.615
25	0.485	0.496	0.436	2.308

405 COMPUTATION - ADDITION (10 items; 1/4 of population)

This scale is designed to assess the pupil's primary knowledge of addition facts. The first eight items are basic (1-digit) combinations requiring only simple recall or the process of counting. The last two items, addition of two 2-digit numbers with no regrouping, require knowledge of the addition algorithm. With the exception of one of the 2-digit items, all problems are presented in sentence format, e.g., 3 + 5 = ☐ ; and each item requires a constructed response. The scale is the same as 311 and is an extension of 409 and 412.

The items which make up this scale come from Form 2-01 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 27 - 36 Pages 54 - 56

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	10
MEAN TOTAL SCORE	=	7.465
STANDARD DEVIATION	=	2.304
CRONBACH'S ALPHA	=	0.822
ERROR OF MEASUREMENT	=	0.973

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
27	0.935	0.938	1.018	0.385
28	0.969	0.973	1.018	0.385
29	0.885	0.891	0.801	0.769
30	0.881	0.891	0.898	1.154
31	0.892	0.910	1.007	1.923
32	0.815	0.851	0.890	4.231
33	0.804	0.857	0.923	6.154
34	0.604	0.657	0.715	8.077
35	0.400	0.550	0.593	27.308
36	0.281	0.493	0.521	43.077

406 NUMBER COMPARISON - ORDER S-1 (3 items; 1/4 of population)

This scale includes selected items from scale 401. These items are 2, 4, and 7. It is the same as 330, 513, and 607.

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	2.327
STANDARD DEV.	=	0.816
CRONBACH'S ALPHA	=	0.370
ERROR OF MEASUREMENT	=	0.648

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
2	0.788	0.788	0.362	0.0
4	0.669	0.696	0.268	3.846
7	0.869	0.869	0.307	0.0

407 PLACE VALUE S (4 items; 1/4 of population)

This scale includes selected items from scale 402. These items are 8, 10, 14, and 15. It is the same as 331, 514, 605, and 710.

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	1.608
STANDARD DEVIATION	=	1.283
CRONBACH'S ALPHA	=	0.605
ERROR OF MEASUREMENT	=	0.807

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
8	0.265	0.273	0.232	2.692
10	0.354	0.390	0.604	9.231
14	0.604	0.616	0.534	1.923
15	0.385	0.400	0.629	3.846

408 APPLICATION S-1 (4 items; 1/4 of population)

This scale includes selected items from scale 404. These items are 22 through 25. It is the same as 333, 516, and 606.

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	2.150
STANDARD DEVIATION	=	1.291
CRONBACH'S ALPHA	=	0.547
ERROR OF MEASUREMENT	=	0.868

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
22	0.519	0.538	0.365	3.462
23	0.631	0.638	0.405	1.154
24	0.515	0.540	0.452	4.615
25	0.485	0.496	0.454	2.308

409 COMPUTATION - ADDITION S-1 (4 items; 1/4 of population)

This scale includes selected items from scale 405. These items are 33 through 36. It is the same as 335 and 518.

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	2.088
STANDARD DEVIATION	=	1.337
CRONBACH'S ALPHA	=	0.708
ERROR OF MEASUREMENT	=	0.723

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
33	0.804	0.857	0.616	6.154
34	0.604	0.657	0.644	8.077
35	0.400	0.550	0.711	27.308
36	0.281	0.493	0.646	43.077

410 NUMBER COMPARISON - ORDER S-2 (2 items; 1/4 of population)

This scale includes selected items from scale 401. These items are 4 and 7. It is the same as 337, 526, 609, and 711.

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	2
MEAN TOTAL SCORE	=	1.538
STANDARD DEVIATION	=	0.610
CRONBACH'S ALPHA	=	0.197
ERROR OF MEASUREMENT	=	0.546

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
4	0.669	0.696	0.150	3.846
7	0.869	0.869	0.183	0.0

411 APPLICATION S-2 (3 items; 1/4 of population)

This scale includes selected items from scale 404. These items are 22, 24, and 25. It is the same as 338, 528, 611, and 714.

SCALE STATISTICS:

NUMBER OF CASES	=	260
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	1.519
STANDARD DEVIATION	=	1.054
CRONBACH'S ALPHA	=	0.489
ERROR OF MEASUREMENT	=	0.754

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
22	0.519	0.538	0.322	3.462
24	0.515	0.540	0.431	4.615
25	0.485	0.496	0.403	2.308

412 COMPUTATION - ADDITION S-2 (1 item; 1/4 of population)

This scale consists of item 36 from scale 405. It is the same as 339, 530, and 717.

RESPONSE	PERCENT	SAMPLE SIZE
correct	28.1	260
incorrect	28.8	
no attempt	43.1	

DESCRIPTION AND STATISTICAL PROPERTIES

OF SCALES - WINTER

SCORING THE GRADE 2 WINTER SCALES

For the attitude scales the response for each item was assigned a value which ranged from 1 for the most negative response to 5 for the most positive response. Eligible values for items with two response choices were 1 and 5, for items with three response choices were 1, 3, and 5, and for items with five response choices were 1 through 5.

The scale score used in calculating the statistics in this report is the sum of the values for all items within the scale.

If a student failed to respond to any item in a scale, he did not receive a scale score.

Item 5 in Form 2-02 does not appear in any scale.

534 ARITHMETIC - DIFFICULT OR EASY (3 items; 3/4 of population)

This scale is designed to measure the ease or difficulty which a pupil associates with mathematics performance. In each item, two contrasting figures performing mathematics problems are presented to the pupil who is to select the figure most descriptive of his performance.

The items which make up this scale come from Form 2-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 1 - 3 Pages 71 - 73

SCALE STATISTICS:

MEAN =	12.45	ALPHA	= 0.65	NO. OF CASES=	916
ST.DEV=	3.74	ERR.MEAS=	2.22		

ITEM STATISTICS:

ITEM	1	2	3
P	3.94	4.33	4.18
ADJ. P	3.95	4.35	4.19
SERIAL CORREL	64	63	71
PERCENT NT	0	1	0

535 ARITHMETIC SELF-IMAGE (7 items; 3/4 of population)

This scale is designed to ascertain how a child sees himself in relation to mathematics. The items in this scale consist of either two or three stick figures each of which is accompanied by a statement. The pupil is to select the figure whose corresponding statement is most descriptive of how he perceives himself to be. This scale is an extension of 536.

The items which make up this scale come from Form 2-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 4, 6 - 11 Pages 74, 76 - 81

SCALE STATISTICS:

MEAN =	30.83	ALPHA =	0.51	NO. OF CASES=	918
ST.DEV=	4.25	ERR.MEAS=	2.98		

ITEM STATISTICS:

ITEM	4	6	7	8	9	10	11
P	4.39	4.66	3.98	4.12	4.46	4.57	4.64
ADJ. P	4.40	4.71	3.99	4.14	4.47	4.57	4.64
SERIAL CORREL	14	39	38	22	34	67	51
PERCENT NT	0	1	0	0	0	0	0

536 ARITHMETIC SELF-IMAGE S (4 itmes; 3/4 of population)

This scale includes selected items from scale 535. These items are 7 through 10.

SCALE STATISTICS:

MEAN =	17.13	ALPHA	= 0.49	NO. OF CASES=	918
ST.DEV=	3.10	ERR.MEAS=	2.22		

ITEM STATISTICS:

ITEM	7	8	9	10
P	3.98	4.12	4.46	4.57
ADJ. P	3.99	4.14	4.47	4.57
SERIAL CORREL	41	26	33	59
PERCENT NT	0	0	0	0

537 LIKES ARITHMETIC (3 items; 3/4 of population)

This scale is designed to measure the extent of pleasure a pupil experiences with regard to mathematics both in an absolute sense and in comparison to other subjects. One item is a three-choice item, each choice consisting of a stick figure and corresponding text; while the other two items consist of a statement and five faces whose expressions range from frowning to smiling. The pupil is to select the figure or expression which best exemplifies his reaction to the accompaning text. This scale is the same as 733 and is an extension of 538.

The items which make up this scale come from Form 2-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 9, 13, 16 Pages 79, 83, 86

SCALE STATISTICS:

MEAN =	11.90	ALPHA =	0.59	NO. OF CASES=	918
ST.DEV=	3.19	ERR.MEAS=	2.05		

ITEM STATISTICS:

ITEM	9	13	16
P	4.46	3.49	3.94
ADJ. P	4.47	3.51	3.94
SERIAL CORREL	32	57	60
PERCENT NT	0	0	0

538 LIKES ARITHMETIC S (2 items; 3/4 of population)

This scale included selected items from scale 537. These items are 13 and 16.

SCALE STATISTICS:

MEAN =	7.44	ALPHA	= 0.69	NO. OF CASES=	918
ST.DEV=	2.76	ERR.MEAS=	1.54		

ITEM STATISTICS:

ITEM	13	16
P	3.49	3.94
ADJ. P	3.51	3.94
SERIAL CORREL	61	63
PERCENT NT	0	1

539 LIKES READING (4 items; 3/4 of population)

This scale is designed to measure a pupil's pleasant experiences with regard to reading (and related areas) both in an absolute sense and in comparison to mathematics. Each item of this scale consists of a statement and five faces whose expressions range from frowning to smiling. The pupil is to select the expression which best exemplifies his feeling regarding the accompanying text. This scale is the same as 732.

The items which make up this scale come from Form 2-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 12, 14, 15, 17 Pages 82, 84, 85, 87

SCALE STATISTICS:

MEAN =	16.70	ALPHA =	0.60	NO. OF CASES=	918
ST.DEV=	3.67	ERR.MEAS=	2.08		

ITEM STATISTICS:

ITEM	12	14	15	17
P	4.23	4.16	4.01	4.31
ADJ. P	4.26	4.17	4.01	4.32
SERIAL CORREL	46	48	66	58
PERCENT NT	1	0	0	0

DESCRIPTION AND STATISTICAL PROPERTIES

OF SCALES - SPRING

SCORING THE GRADE 2 SPRING SCALES

For all the scales in the spring testing, the items were scored as follows:

correct response

incorrect or
multiple response

non-attempt.

The actual scale score used in calculating the statistics in this report is the sum of correct responses for all items within the scale.

Items 16 through 22 in Form 2-04 do not appear in any scale. The items were excluded from the test administration because it was felt that they would be too difficult for the children.

501 VOCABULARY (GROUP) (23 items)

This scale is designed to ascertain the pupil's comprehension of certain key concepts and to determine to what extent knowledge of these concepts facilitates or hinders mathematical progress as measured by other scales. In addition to general terms already in the pupil's vocabulary, the items of this scale contain lexical entries specific to the mathematics curriculum. Both multiple choice and constructed response formats are used.

The items which make up this scale come from Form 2-03 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 1 - 23 Pages 119 - 127

SCALE STATISTICS:

NUMBER OF CASES	=	930
NUMBER OF ITEMS	=	23
MEAN TOTAL SCORE	=	17.329
STANDARD DEVIATION	=	3.255
CRONBACH'S ALPHA	=	0.721
ERROR OF MEASUREMENT	=	1.720

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
1	0.941	0.941	0.438	0.0
2	0.828	0.851	0.425	2.688
3	0.543	0.555	0.606	2.151
4	0.958	0.960	0.277	0.215
5	0.978	0.981	0.375	0.215
6	0.861	0.863	0.211	0.215
7	0.472	0.564	0.200	16.344
8	0.951	0.956	0.292	0.538
9	0.962	0.965	0.564	0.323
10	0.411	0.436	0.480	5.806
11	0.489	0.507	0.645	3.441
12	0.976	0.978	0.094	0.215
13	0.758	0.765	0.688	0.860
14	0.589	0.608	0.259	3.118
15	0.985	0.991	0.243	0.645
16	0.765	0.769	0.694	0.645
17	0.880	0.882	0.304	0.323
18	0.572	0.612	0.336	6.559
19	0.382	0.405	0.261	5.699
20	0.867	0.883	0.550	1.828
21	0.508	0.526	0.405	3.441
22	0.974	0.975	-0.014	0.108
23	0.680	0.709	0.495	4.086

502 WHOLE NUMBER COMPREHENSION (8 items)

The items in this scale are designed to measure the pupil's understanding of the relationships of set manipulations to arithmetic operations. Two of the items associate joining sets with the operation of addition; four items interpret subtraction in relation to either set partitioning or removing objects from sets, and two items relate multiplication to joining equivalent sets or to an array. All items require multiple choice responses.

The items which make up this scale come from Form 2-03 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 24 - 31 Pages 128 - 130

SCALE STATISTICS:

NUMBER OF CASES	=	930
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.487
STANDARD DEVIATION	=	1.884
CRONBACH'S ALPHA	=	0.594
ERROR OF MEASUREMENT	=	1.201

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
24	0.524	0.532	0.344	1.505
25	0.892	0.904	0.426	1.290
26	0.216	0.221	0.171	2.151
27	0.555	0.592	0.361	6.237
28	0.510	0.546	0.496	6.667
29	0.530	0.580	0.425	8.602
30	0.527	0.587	0.436	10.215
31	0.733	0.780	0.458	6.022

503 NUMBER COMPARISON - ORDER (8 items)

The items in this scale are designed to assess the pupil's understanding of numerical order in terms of both cardinality and ordinality. The pupil is required to identify objects as well as construct responses to indicate his knowledge of certain basic notions of order, including the concepts "fewer than," "between," "least," "before," "middle," and "last." It is the same as 603 and is an extension of 513, 526 and 527.

The items which make up this scale come from Form 2-03 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 32 - 39 Pages 131 - 133

SCALE STATISTICS:

NUMBER OF CASES	=	930
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	5.042
STANDARD DEVIATION	=	1.941
CRONBACH'S ALPHA	=	0.664
ERROR OF MEASUREMENT	=	1.125

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
32	0.772	0.788	0.660	2.043
33	0.737	0.752	0.349	2.043
34	0.628	0.655	0.521	4.086
35	0.835	0.842	0.552	0.753
36	0.324	0.328	0.232	1.290
37	0.614	0.627	0.634	2.151
38	0.331	0.339	0.458	2.366
39	0.801	0.808	0.471	0.860

504 PLACE VALUE (8 items)

This scale is designed to measure the pupil's ability to interpret the meaning of symbols in the numeration system. The items are basically of two types: identification of a digit in reference to its location or identification of a numeral in terms of its description. There are two exceptions to this general format. One case requires the interpretation of a numeral in terms of a pictorial display, while the other requires completion of expanded notation. This scale consists of four multiple choice items and four items requiring constructed responses. It is the same as 601 and 702, and is an extension of 514.

The items which make up this scale come from Form 2-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 1 - 8 Pages 158 - 160

SCALE STATISTICS:

NUMBER OF CASES	=	915
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	3.422
STANDARD DEVIATION	=	2.141
CRONBACH'S ALPHA	=	0.728
ERROR OF MEASUREMENT	=	1.116

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. RIS	PERCENT NT
1	0.439	0.447	0.519	1.639
2	0.613	0.631	0.690	2.842
3	0.587	0.603	0.587	2.732
4	0.610	0.623	0.706	2.077
5	0.572	0.575	0.421	0.546
6	0.188	0.217	0.703	13.224
7	0.322	0.325	0.584	0.765
8	0.091	0.092	0.158	0.874

505 NUMBER LINE (7 items)

This scale is designed to test the pupil's ability to interpret a numerical system in terms of a geometric concept. Four of the items, each requiring constructed responses, deal with numerical order and the notion of correspondence, while the remaining three items require an interpretation of addition or subtraction in terms of actions performed on the number line. It is an extension of 515.

The items which make up this scale come from Form 2-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 9 - 15 Pages 161 - 163

SCALE STATISTICS:

NUMBER OF CASES	=	915
NUMBER OF ITEMS	=	7
MEAN TOTAL SCORE	=	3.733
STANDARD DEVIATION	=	1.357
CRONBACH'S ALPHA	=	0.504
ERROR OF MEASUREMENT	=	0.955

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
9	0.931	0.932	0.643	0.109
10	0.906	0.916	0.583	1.093
11	0.573	0.580	0.365	1.202
12	0.009	0.010	0.453	8.634
13	0.575	0.617	0.354	6.885
14	0.186	0.193	0.505	3.934
15	0.554	0.599	0.164	7.432

506 APPLICATION (8 items)

This scale is composed of eight story problems which are designed to measure the pupil's ability to select and perform the relevant arithmetic operations. Seven of the items involve either addition or subtraction or both, while the eighth deals with partitioning a set into two equivalent groups. The format for all the items in this scale is multiple choice. It is the same as 602 and is an extension of 516, 528, and 529.

The items which make up this scale come from Form 2-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 23 - 30 Pages 165 - 167

SCALE STATISTICS:

NUMBER OF CASES	=	915
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.698
STANDARD DEVIATION	=	1.927
CRONBACH'S ALPHA	=	0.590
ERROR OF MEASUREMENT	=	1.233

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. RIS	PERCENT NT
23	0.655	0.660	0.584	0.765
24	0.725	0.731	0.432	0.874
25	0.566	0.572	0.556	1.093
26	0.515	0.525	0.386	1.967
27	0.772	0.780	0.474	1.093
28	0.657	0.688	0.317	4.590
29	0.338	0.350	0.345	3.607
30	0.472	0.498	0.012	5.137

507 RATIONALS (8 items)

The items in this scale are designed to measure the pupil's rudimentary concepts of rational numbers. In general, pupils are required to associate a fraction with its corresponding pictorial representation. Only one of the items requires a constructed response; the others are in multiple choice format. This scale is an extension of 517.

The items which make up this scale come from Form 2-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 31 - 38 Pages 168 - 170

SCALE STATISTICS:

NUMBER OF CASES	=	845
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	3.583
STANDARD DEVIATION	=	1.534
CRONBACH'S ALPHA	=	0.322
ERROR OF MEASUREMENT	=	1.263

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	R.S. BIS	PERCENT NT
31	0.818	0.831	0.242	1.538
32	0.213	0.218	0.068	2.249
33	0.367	0.377	0.118	2.604
34	0.491	0.504	0.083	2.485
35	0.388	0.396	0.286	1.893
36	0.234	0.244	0.013	3.905
37	0.428	0.441	0.354	2.959
38	0.644	0.658	0.189	2.130

508 ORDERING PICTURED SETS (GROUP) (3 items)

This scale, designed to provide continuity to an earlier scale on ordering, serves as a criterion for the comparison of the pupil's progress. Both scales deal with ordering pictured sets of objects. However, this scale is more abstract in that the pupil is required to count sets of pictured objects, then assign to each set a digit (1, 2, 3, 4) which corresponds to its relative order of size; whereas, in the prior, individually administered scale, the pupil indicated relative order of size by manipulating cards. All items require constructed responses.

The items which make up this scale come from Form 2-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 39 - 41 Pages 172 - 174

SCALE STATISTICS:

NUMBER OF CASES	=	915
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	1.529
STANDARD DEVIATION	=	1.209
CRONBACH'S ALPHA	=	0.735
ERROR OF MEASUREMENT	=	0.623

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
39	0.521	0.522	0.669	0.219
40	0.544	0.550	0.781	1.093
41	0.463	0.469	0.654	1.093

509 COUNTING (2 items)

The two items in this scale are included to provide continuity to previously administered counting items. Each item consists of a picture of at least 17 circles which appear to be randomly placed. The pupil is required to count the circles and record his response for each of the items.

The items which make up this scale come from Form 2-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 42 and 43 Pages 175, 176

SCALE STATISTICS:

NUMBER OF CASES	=	915
NUMBER OF ITEMS	=	2
MEAN TOTAL SCORE	=	1.764
STANDARD DEVIATION	=	0.494
CRONBACH'S ALPHA	=	0.298
ERROR OF MEASUREMENT	=	0.414

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	R.S. BIS	PERCENT NT
42	0.902	0.909	0.304	0.765
43	0.862	0.878	0.277	1.749

510 COMPUTATION - ADDITION (8 items)

This scale is designed to assess the pupil's primary knowledge of addition facts and the addition algorithm. The items range from basic 1-digit combinations, requiring only simple recall or counting, to the addition of two 3-digit numbers, requiring regrouping. Items are presented in both sentence and vertical formats, and each item required a constructed response. The scale is an extension of 518, 530, and 531.

The items which make up this scale come from Form 2-05 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 4 - 11 Pages 190, 191

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	5.134
STANDARD DEVIATION	=	2.098
CRONBACH'S ALPHA	=	0.773
ERROR OF MEASUREMENT	=	1.000

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	R.S. BIS	PERCENT NT
4	0.927	0.941	0.670	1.582
5	0.765	0.828	0.757	7.571
6	0.751	0.822	0.650	8.588
7	0.855	0.877	0.728	2.486
8	0.658	0.715	0.762	8.023
9	0.241	0.297	0.523	18.983
10	0.610	0.668	0.651	8.701
11	0.328	0.437	0.614	24.972

511 COMPUTATION - SUBTRACTION (8 items)

This scale parallels scale 510. It consists of items which range from inverses of basic 1-digit addition combinations requiring either simple recall or manipulation of small sets, to items involving the subtraction of 2-digit numbers which require knowledge of an algorithm with regrouping. Items are presented in both sentence and vertical format, and each of the eight items requires a constructed response. This scale is the same as 604 and is an extension of 519, 532, and 533.

The items which make up this scale come from Form 2-05 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 12 - 19 Pages 192, 193

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.225
STANDARD DEVIATION	=	2.161
CRONBACH'S ALPHA	=	0.783
ERROR OF MEASUREMENT	=	1.007

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
12	0.861	0.872	0.514	1.243
13	0.590	0.660	0.709	10.621
14	0.574	0.670	0.662	14.350
15	0.585	0.643	0.726	8.927
16	0.759	0.789	0.841	3.729
17	0.102	0.145	0.554	29.943
18	0.131	0.179	0.580	26.667
19	0.623	0.690	0.737	9.718

512 COMPUTATION - MULTIPLICATION (8 items)

This scale is designed to assess the pupil's knowledge of multiplication facts. Five of the items are basic 1-digit combinations, while the remaining three items require the multiplication of a 1-digit number and a 2-digit number with no regrouping. With the exception of one example, all items are presented in sentence format. The scale is an extension of 520.

The items which make up this scale come from Form 2-05 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 20 - 27 Pages 194, 195

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	2.087
STANDARD DEVIATION	=	2.437
CRONBACH'S ALPHA	=	0.872
ERROR OF MEASUREMENT	=	0.871

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
20	0.468	0.576	0.879	18.757
21	0.346	0.452	1.038	23.503
22	0.399	0.528	0.957	24.407
23	0.087	0.140	0.765	37.740
24	0.250	0.347	0.973	28.136
25	0.191	0.306	0.935	37.514
26	0.084	0.140	0.831	40.226
27	0.263	0.343	0.704	23.164

513 NUMBER COMPARISON - ORDER S-1 (3 items)

This scale includes selected items from scale 503. These items are 32 through 34. It is the same as 330, 406, and 607.

SCALE STATISTICS:

NUMBER OF CASES	=	930
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	2.137
STANDARD DEVIATION	=	0.941
CRONBACH'S ALPHA	=	0.478
ERROR OF MEASUREMENT	=	0.680

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
32	0.772	0.788	0.558	2.043
33	0.737	0.752	0.254	2.043
34	0.628	0.653	0.409	3.871

514 PLACE VALUE S · (4 items)

This scale includes selected items from scale 504. These items are 1 through 4. It is the same as 331, 407, 605, and 710.

SCALE STATISTICS:

NUMBER OF CASES	=	915
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	2.249
STANDARD DEVIATION	=	1.438
CRONBACH'S ALPHA	=	0.712
ERROR OF MEASUREMENT	=	0.772

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
1	0.439	0.447	0.520	1.639
2	0.613	0.631	0.731	2.842
3	0.587	0.603	0.565	2.732
4	0.610	0.623	0.717	2.077

515 NUMBER LINE (3 items)

This scale includes selected items from scale 505. These items are 9 through 11. It is the same as 332 and 713.

SCALE STATISTICS:

NUMBER OF CASES	=	915
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	2.410
STANDARD DEVIATION	=	0.809
CRONBACH'S ALPHA	=	0.598
ERROR OF MEASUREMENT	=	0.513

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
9	0.931	0.932	0.979	0.109
10	0.906	0.916	0.938	1.093
11	0.573	0.580	0.409	1.202

516 APPLICATION S-1 (4 items)

This scale includes selected items from scale 506. These items are 23 through 26. It is the same as 333, 408, and 606.

SCALE STATISTICS:

NUMBER OF CASES	=	915
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	2.460
STANDARD DEVIATION	=	1.303
CRONBACH'S ALPHA	=	0.610
ERROR OF MEASUREMENT	=	0.814

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
23	0.655	0.660	0.502	0.765
24	0.725	0.731	0.490	0.874
25	0.566	0.572	0.582	1.093
26	0.515	0.525	0.433	1.967

517 RATIONALS S (7 items)

This scale includes selected items from scale 507. These items are 31 through 37. It is the same as 334 and 716.

SCALE STATISTICS:

NUMBER OF CASES	=	845
NUMBER OF ITEMS	=	7
MEAN TOTAL SCORE	=	2.940
STANDARD DEVIATION	=	1.389
CRONBACH'S ALPHA	=	0.283
ERROR OF MEASUREMENT	=	1.176

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
31	0.818	0.832	0.180	1.657
32	0.213	0.218	0.047	2.249
33	0.367	0.377	0.129	2.604
34	0.491	0.504	0.072	2.485
35	0.388	0.396	0.321	1.893
36	0.234	0.244	0.027	3.905
37	0.428	0.441	0.289	2.959

518 COMPUTATION - ADDITION S-1 (4 items)

This scale includes selected items from scale 510. These items are 4 through 7. It is the same as 335 and 409.

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	3.298
STANDARD DEVIATION	=	1.054
CRONBACH'S ALPHA	=	0.663
ERROR OF MEASUREMENT	=	0.612

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
4	0.927	0.941	0.818	1.582
5	0.765	0.828	0.674	7.571
6	0.751	0.822	0.614	8.588
7	0.855	0.877	0.695	2.486

519 COMPUTATION - SUBTRACTION S-1 (6 items)

This scale includes selected items from scale 511. These items are 12 through 16 and 19. It is the same as 336 and 608.

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	6
MEAN TOTAL SCORE	=	3.992
STANDARD DEVIATION	=	1.910
CRONBACH'S ALPHA	=	0.783
ERROR OF MEASUREMENT	=	0.889

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
12	0.861	0.872	0.545	1.243
13	0.590	0.660	0.698	10.621
14	0.574	0.670	0.642	14.350
15	0.585	0.643	0.721	8.927
16	0.759	0.789	0.885	3.729
19	0.623	0.690	0.734	9.718

520 COMPUTATION - MULTIPLICATION S (2 items)

This scale includes selected items from scale 512. These items are 20 and 21. It is the same as 313 and 721.

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	2
MEAN TOTAL SCORE	=	0.814
STANDARD DEVIATION	=	0.895
CRONBACH'S ALPHA	=	0.812
ERROR OF MEASUREMENT	=	0.387

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
20	0.468	0.576	0.859	18.757
21	0.346	0.452	0.883	23.503

521 IDENTIFYING POLYGONS (9 items)

This scale includes only those items which are polygons in a display of 16 geometric figures, including both open and closed curves. The scale is designed to ascertain whether pupils know and recognize those distinctive features which differentiate the class of polygons from other geometric figures.

The items which make up this scale come from Form 2-05 which is reproduced elsewhere in this report. The item numbers and page reference are listed below.

Items 28, 30, 32, 33, 36, 38, 41, 42, 43 — Page 187

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	9
MEAN TOTAL SCORE	=	2.397
STANDARD DEVIATION	=	2.628
CRONBACH'S ALPHA	=	0.854
ERROR OF MEASUREMENT	=	1.004

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
28	0.298	0.299	0.867	0.113
30	0.203	0.203	0.950	0.0
32	0.469	0.469	0.502	0.113
33	0.203	0.203	0.907	0.0
36	0.286	0.286	0.765	0.113
38	0.408	0.408	0.538	0.0
41	0.158	0.158	0.973	0.0
42	0.190	0.190	0.929	0.0
43	0.181	0.181	0.936	0.0

522 CURVED AND OPEN FIGURES (7 items)

This scale is extracted from the same display of 16 geometric figures as scale 521. It consists of the seven curved or open geometric figures in the display which are not polygons. Scores are determined by pupils not identifying one of these figures as a polygon.

The items which make up this scale come from Form 2-05 which is reproduced elsewhere in this report. The item numbers and page reference are listed below.

Items 29, 31, 34, 35, 37, 39, 40 Page 187

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	7
MEAN TOTAL SCORE	=	6.108
STANDARD DEVIATION	=	1.260
CRONBACH'S ALPHA	=	0.600
ERROR OF MEASUREMENT	=	0.797

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
29	0.872	0.872	0.535	0.0
31	0.895	0.895	0.642	0.0
34	0.802	0.802	0.393	0.0
35	0.901	0.901	0.556	0.0
37	0.892	0.892	0.350	0.0
39	0.877	0.877	0.551	0.0
40	0.870	0.870	0.576	0.0

523 IDENTIFYING TRIANGLES (6 items)

This scale includes only those items which are triangles in a display of 26 simple closed symmetric curves, including polygons, circles, ellipses, and figures containing both straight and curved lines. It is designed to determine whether pupils can identify those distinctive features which distinguish triangles from other simple closed curves. The scale is the same as 321.

The items which make up this scale come from Form 2-05 which is reproduced elsewhere in this report. The item numbers and page reference are listed below.

Items 45, 50, 51, 57, 62, 66 Page 188

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	6
MEAN TOTAL SCORE	=	4.707
STANDARD DEVIATION	=	1.763
CRONBACH'S ALPHA	=	0.830
ERROR OF MEASUREMENT	=	0.726

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
45	0.908	0.908	0.940	0.0
50	0.847	0.847	0.934	0.0
51	0.881	0.881	1.017	0.0
57	0.692	0.692	0.883	0.0
62	0.714	0.714	0.782	0.0
66	0.664	0.664	0.829	0.0

524 CONGRUENCE (4 items)

This scale includes only those items which are congruent in a display of 14 simple closed curves, one of which serves as a model to which the other 13 are to be compared. Six of the 13 figures are similar to the model; however, only four of these six are congruent to the model. This scale is designed to assess the pupil's concept of congruence, particularly whether it includes the two aspects of size and shape.

The items which make up this scale come from Form 2-05 which is reproduced elsewhere in this report. The item numbers and page reference are listed below.

Items 73, 79, 81 82 Page 189

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	3.585
STANDARD DEVIATION	=	0.892
CRONBACH'S ALPHA	=	0.713
ERROR OF MEASUREMENT	=	0.478

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
73	0.879	0.879	0.721	0.0
79	0.914	0.914	1.028	0.0
81	0.882	0.882	0.958	0.0
82	0.910	0.910	0.716	0.0

525 SIMILARITY (2 items)

This scale is extracted from the same display of 14 geometric shapes as scale 524. It consists of the two figures that have the same shape as the model figure but are different in the size aspect. Scores are determined by pupils not selecting these figures as being congruent to the model.

The items which make up this scale come from Form 2-05 which is reproduced elsewhere in this report. The item numbers and page reference are listed below.

Items 70 and 77 Page 189

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	2
MEAN TOTAL SCORE	=	0.530
STANDARD DEVIATION	=	0.732
CRONBACH'S ALPHA	=	0.551
ERROR OF MEASUREMENT	=	0.490

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	R.S. BIS	PERCENT NT
70	0.241	0.241	0.523	0.0
77	0.289	0.289	0.505	0.0

526 NUMBER COMPARISON - ORDER S-2 (2 items)

This scale includes selected items from scale 503. These items are 33 and 34. It is the same as 337, 410, 609, and 711.

SCALE STATISTICS:

NUMBER OF CASES	=	930
NUMBER OF ITEMS	=	2
MEAN TOTAL SCORE	=	1.365
STANDARD DEVIATION	=	0.691
CRONBACH'S ALPHA	=	0.206
ERROR OF MEASUREMENT	=	0.615

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
33	0.737	0.753	0.156	2.151
34	0.628	0.655	0.147	4.086

527 NUMBER COMPARISON - ORDER S-3 (5 items)

This scale includes selected items from scale 503. These items are 33, 34, 36, 37, and 38. It is the same as 610 and 712.

SCALE STATISTICS:

NUMBER OF CASES	=	930
NUMBER OF ITEMS	=	5
MEAN TOTAL SCORE	=	2.633
STANDARD DEVIATION	=	1.377
CRONBACH'S ALPHA	=	0.522
ERROR OF MEASUREMENT	=	0.952

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
33	0.737	0.753	0.298	2.151
34	0.628	0.655	0.404	4.086
36	0.324	0.328	0.226	1.290
37	0.614	0.627	0.510	2.151
38	0.331	0.339	0.443	2.366

528 APPLICATION S-2 (3 items)

This scale includes selected items from scale 506. These items are 23, 25, and 26. It is the same as 338, 411, 611, and 714.

SCALE STATISTICS:

NUMBER OF CASES	=	913
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	1.736
STANDARD DEVIATION	=	1.071
CRONBACH'S ALPHA	=	0.557
ERROR OF MEASUREMENT	=	0.713

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
23	0.655	0.660	0.463	0.765
25	0.566	0.572	0.542	1.093
26	0.515	0.525	0.396	1.967

529 APPLICATION S-3 (6 items)

This scale includes selected items from scale 506. These items are 23, 25, 26, 28, 29, and 30. It is the same as 612 and 715.

SCALE STATISTICS:

NUMBER OF CASES	=	915
NUMBER OF ITEMS	=	6
MEAN TOTAL SCORE	=	3.202
STANDARD DEVIATION	=	1.552
CRONBACH'S ALPHA	=	0.493
ERROR OF MEASUREMENT	=	1.105

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
23	0.655	0.660	0.492	0.765
25	0.566	0.572	0.453	1.093
26	0.515	0.525	0.329	1.967
28	0.657	0.688	0.311	4.590
29	0.338	0.350	0.343	3.607
30	0.472	0.498	0.028	5.137

530 COMPUTATION - ADDITION S-2 (1 item)

This scale consists of item 6 from scale 510. It is the same as 339, 412, and 717.

RESPONSE	PERCENT	SAMPLE SIZE
correct	75.1	885
incorrect	16.4	
no attempt	8.5	

531 COMPUTATION - ADDITION S-3 (5 items)

This scale includes selected items from scale 510. These items are 6 and 8 through 11. It is the same as 718.

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	5
MEAN TOTAL SCORE	=	2.588
STANDARD DEVIATION	=	1.555
CRONBACH'S ALPHA	=	0.706
ERROR OF MEASUREMENT	=	0.843

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
6	0.751	0.822	0.544	8.588
8	0.658	0.715	0.698	8.023
9	0.241	0.297	0.550	18.983
10	0.610	0.668	0.613	8.701
11	0.328	0.437	0.637	24.972

532 COMPUTATION - SUBTRACTION S-2 (4 items)

This scale includes selected items from scale 511. These items are 12, 13, 15, and 19. It is the same as 340, 613, and 719.

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	2.659
STANDARD DEVIATION	=	1.306
CRONBACH'S ALPHA	=	0.677
ERROR OF MEASUREMENT	=	0.742

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
12	0.861	0.873	0.486	1.356
13	0.590	0.660	0.603	10.621
15	0.585	0.643	0.679	8.927
19	0.623	0.690	0.667	9.718

533 COMPUTATION - SUBTRACTION S-3 (6 items)

This scale includes selected items from scale 511. These items are 12, 13, 15, and 17 through 19. It is the same as 614 and 720.

SCALE STATISTICS:

NUMBER OF CASES	=	885
NUMBER OF ITEMS	=	6
MEAN TOTAL SCORE	=	2.892
STANDARD DEVIATION	=	1.574
CRONBACH'S ALPHA	=	0.694
ERROR OF MEASUREMENT	=	0.871

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
12	0.861	0.873	0.446	1.356
13	0.590	0.660	0.628	10.621
15	0.585	0.643	0.681	8.927
17	0.102	0.145	0.581	29.943
18	0.131	0.179	0.579	26.667
19	0.623	0.690	0.673	9.718

APPENDICES

APPENDIX A

WECHSLER INTELLIGENCE SCALE FOR CHILDREN

by David Wechsler

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The Wechsler Intelligence Scale for Children (WISC) measures general intelligence for children ages 5 through 15. The total scale consists of five performance subtests and five verbal subtests. The two verbal (Vocabulary, Similarities) and two performance (Picture Completion, Block Design) subtests administered in ELMA are similar to the four subtests selected for the short form of the WPPSI which was administered in the first year of this study. These subtests were selected because previous research had shown them to be both reliable and valid indicators of intelligence as measured by the total verbal and performance scores. For these subtests no reading is required; all directions and items using words are read to the child; the test is stopped after a specified number of consecutive errors.

The four WISC subtests were administered to second graders in one ELMA test center only (80 percent of the total ELMA population) during February and March of the second grade. They were administered to each child individually by ELMA testers.

The WISC scaled scores for a child are obtained from the tables in the WISC manual by using the child's chronological age at the time of testing and the child's raw score on the subscale.

M301 WISC VOCABULARY RAW SCORE (40 items)

This is the number of points received on the Wechsler Intelligence Scale for Children, Vocabulary Test. The child is asked to define words of varying difficulty. Scores for this scale are available for only one test center (4/5 of the ELMA population).

SCALE STATISTICS:

NUMBER OF CASES	=	947
TOTAL MEAN SCORE	=	23.820
STANDARD DEVIATION	=	6.519

M302 WISC SIMILARITIES RAW SCORE (16 items)

This is the number of points received on the Wechsler Intelligence Scale for Children, Similarities Test. For the first four items, the child supplies a missing word at the end of a sentence. For the last 12 items, the child is to explain briefly in what way two things named by the tester are alike. Scores for this scale are available for only one test center (4/5 of the ELMA population).

SCALE STATISTICS:

NUMBER OF CASES	=	946
TOTAL MEAN SCORE	=	7.029
STANDARD DEVIATION	=	2.765

M303 WISC PICTURE COMPLETION RAW SCORE (20 items)

This is the number of points received on the Wechsler Intelligence Scale for Children, Picture Completion Test. The child is to discover and name the missing part of each of a series of incompletely drawn pictures. Scores for this scale are available for only one test center (4/5 of the ELMA population).

SCALE STATISTICS:

NUMBER OF CASES	=	944
TOTAL MEAN SCORE	=	8.161
STANDARD DEVIATION	=	1.992

M304 WISC BLOCK DESIGN RAW SCORE (10 items)

This is the number of points received on the Wechsler Intelligence Scale for Children, Block Design Test. The child is to construct a given geometric design with a set of cubical blocks. Four surfaces of each block are painted one color while two surfaces have different colors on two sides of the diagonal. For the first three designs, the child is given two chances to make the design after the examiner has first constructed a model. For the last seven items, the child is to reproduce designs from pictured designs represented on cards, and he is given only one chance. All the items are timed. Scores for this scale are available for only one test center (4/5 of the ELMA population).

SCALE STATISTICS:

NUMBER OF CASES	=	941
TOTAL MEAN SCORE	=	11.233
STANDARD DEVIATION	=	8.302

M305 WISC VOCABULARY SCALED SCORE (See M301)

SCALE STATISTICS:

NUMBER OF CASES	=	947
TOTAL MEAN SCORE	=	10.735
STANDARD DEVIATION	=	3.280

M306 WISC SIMILARITIES SCALED SCORE (See M302)

SCALE STATISTICS:

NUMBER OF CASES	=	946
TOTAL MEAN SCORE	=	11.163
STANDARD DEVIATION	=	3.183

M307 WISC PICTURE COMPLETION SCALED SCORE (See M303)

SCALE STATISTICS:

NUMBER OF CASES	=	944
TOTAL MEAN SCORE	=	9.939
STANDARD DEVIATION	=	2.746

M308 WISC BLOCK DESIGN SCALED SCORE (See M304)

SCALE STATISTICS:

NUMBER OF CASES	=	941
TOTAL MEAN SCORE	=	10.821
STANDARD DEVIATION	=	2.996

M309 WISC SHORT FORM VERBAL SCALED SCORE

This is the sum of the scaled scores for M305 and M306.

SCALE STATISTICS:

NUMBER OF CASES	=	946
TOTAL MEAN SCORE	=	21.897
STANDARD DEVIATION	=	5.733

M310 WISC SHORT FORM PERFORMANCE SCALED SCORE

This is the sum of the scaled scores for M307 and M308.

SCALE STATISTICS:

NUMBER OF CASES	=	940
TOTAL MEAN SCORE	=	20.771
STANDARD DEVIATION	=	4.740

M311 WISC SHORT FORM TOTAL SCALED SCORE

This is the sum of the scaled scores for M305, M306, M307, and M308.

SCALE STATISTICS:

NUMBER OF CASES	=	940
TOATL MEAN SCORE	=	42.686
STANDARD DEVIATION	=	9.079

APPENDIX B

STANFORD ACHIEVEMENT TEST

PRIMARY II BATTERY

FORM W

by Truman L. Kelley
Richard Madden
Eric F. Gardner
Herbert C. Rudman

Copyright 1964 by Harcourt, Brace and World, Inc., New York

The Stanford Achievement Test, Primary Battery II, Form W is one of a series of tests developed to measure the important knowledges, skills, and understandings commonly accepted as desirable outcomes of the major branches of the elementary curriculum. The Primary II Battery is designed for use from the middle of Grade 2 to the end of Grade 3 and includes nine subtests.

Two subtests, Word Meaning and Paragraph Meaning, were administered to the ELMA population by the school districts as part of a state-required testing program. The tests were administered by classroom teachers in a group situation in both centers in May, 1969 (spring of Grade 2). Both test centers provided grade score data for students participating in ELMA, and the center having the largest proportion of the sample also sent raw scores. Raw scores are converted to grade scores from tables printed in the test booklets. The grade score indicates the median score made by pupils in the norming sample at a specified grade placement.

A301 WORD MEANING: NUMBER RIGHT (36 items)

This scale is the total number of correct responses on the Stanford Achievement Primary II Battery, Form W, Word Meaning Test. The test is graduated in difficulty and requires the child to read a sentence and to select a correct word to complete the sentence. This subtest is timed (12 minutes), and the child is to work alone after being given directions. Scores for this scale are available for only one test center (4/5 of the ELMA population).

SCALE STATISTICS:

NUMBER OF CASES	=	946
TOTAL MEAN SCORE	=	17.208
STANDARD DEVIATION	=	7.474

A302 WORD MEANING: GRADE SCORE

This scale is derived from A301.

SCALE STATISTICS:

NUMBER OF CASES	=	946
TOTAL MEAN SCORE	=	28.043
STANDARD DEVIATION	=	9.614

A303 PARAGRAPH MEANING: NUMBER RIGHT (60 items)

This scale is the total number of correct responses on the Stanford Achievement Primary II Battery, Form W, Paragraph Meaning Test. The test is graduated in difficulty and consists of a series of paragraphs from each of which one or more words have been omitted. The child is to select the proper word for each omission from four choices that are afforded him. This subtest is timed (25 minutes), and the child is to work alone after being given directions. Scores for this scale are available for only one test center (4/5 of the ELMA population).

SCALE STATISTICS:

NUMBER OF CASES	=	947
TOTAL MEAN SCORE	=	27.624
STANDARD DEVIATION	=	12.841

A304 PARAGRAPH MEANING: GRADE SCORE

This scale is der d from A303.

SCALE STATISTICS:

NUMBER OF CASES	=	945
TOTAL MEAN SCORE	=	27.511
STANDARD DEVIATION	=	9.482

A305 TOTAL READING: NUMBER RIGHT (96 items)

This is obtained by adding the raw scores on the Word Meaning and the Paragraph Meaning tests. Scores for this scale are available for only one test center (4/5 of the ELMA population).

SCALE STATISTICS:

NUMBER OF CASES	=	947
TOTAL MEAN SCORE	=	44.784
STANDARD DEVIATION	=	19.573

A306 TOTAL READING: GRADE SCORE

This is obtained by adding the raw scores on the Word Meaning and the Paragraph Meaning tests and then using a conversion table provided by the publisher to determine the Total Reading Grade Score.

SCALE STATISTICS:

NUMBER OF CASES	=	947
TOTAL MEAN SCORE	=	27.528
STANDARD DEVIATION	=	8.840

A307 WORD STUDY SKILLS: NUMBER RIGHT (64 items)

This is an optional test. It was administered to a very small proportion of the ELMA population and, therefore, is not utilized in any analyses.

A308 WORD STUDY SKILLS: GRADE SCORE

See A307.

APPENDIX C

Formulas for Item and Scale Statistics

A. Formulas Used for Scales Containing Dichotomous Items

The formulas for the statistics presented for each ELMA scale will be shown. The statistics were obtained from the SMSG Item Analysis Program.[1] This program handles only dichotomous items.

Let X_{ij} be the score for case j on item i.

The items were scored so that

$$X_{ij} = \begin{cases} 1, & \text{if case } j \text{ responds correctly to item } i \\ 0, & \text{otherwise} \end{cases}$$

Let n = total number of cases

n_i = the number who attempted item i

k = total number of items on the scale.

The Item Mean, P, is

$$\bar{X}_i = \frac{1}{n} \sum_{j=1}^{n} X_{ij}$$

and the Adjusted Item Mean, ADJ. P, is

$$\hat{\bar{X}}_i = \frac{1}{n_i} \sum_{j=1}^{n} X_{ij}$$

$$\text{PERCENT NT} = \frac{n - n_i}{n}$$

The non-spurious Biserial Correlation coefficient, N.S. BIS, is

$$r = \frac{r_{bis}\,\sigma - \frac{pq}{z}}{\sqrt{\sigma^2 + pq - 2r_{bis}\,\sigma z}},$$

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[1] For a description of the computer program for the IBM 360/67, see the unpublished SMSG paper "Item Analysis Program" by W. E. Geeslin and Ed Cruz.

where

$p = \bar{X}_i$ = proportion of cases getting item correct

$q = 1 - \bar{X}_i$ = proportion of cases getting item incorrect

Z = ordinate for unit normal curve at point where proportion of cases cut off is p

Y_{ij} = the total scale score <u>with item i</u> removed for case j

σ = the standard deviation of the Y_{ij}'s

d = difference in mean score of the Y_{ij}'s for those cases with item i correct and those cases with item i incorrect

$$r_{bis} = \frac{pq}{z}\left(\frac{d}{\sigma}\right).$$

The scale score for case j is

$$S_j = \sum_{i=1}^{k} X_{ij} .$$

The scale <u>MEAN TOTAL SCORE</u> is

$$\bar{S} = \frac{1}{n} \sum_{j=1}^{n} S_j = \sum_{i=1}^{k} \bar{X}_i .$$

The total scale variance is

$$V_t = \frac{1}{n} \sum_{j=1}^{n} S_j^2 - \bar{S}^2$$

The total scale <u>STANDARD DEVIATION</u> is

$$S_t = \sqrt{V_t} .$$

The item variance for item i is

$$V_i = \frac{\Sigma X_i^{\,2} - \frac{(\Sigma X_i)^2}{n}}{n}$$

CRONBACH'S ALPHA (reliability) is

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k} V_i}{V_t}\right)$$

The standard ERROR OF MEASUREMENT is

$$S_e = \sqrt{V_t - \alpha V_t}$$

$$= S_t\sqrt{1-\alpha} \ .$$

B. Formulas Used for Attitude Scales

The items of the attitude scales were not dichotomous. A different computer program was used to calculate item and scale statistics for the attitude scales.(2)

The serial correlation coefficient replaced the biserial coefficient for the attitude items. For a description of the calculation of the serial correlation coefficient see the articles by Jaspen(3, 4) or the text by Wert.(5)

All other formulas remain the same as those used above except that item responses are not restricted to "0" and "1", and the unbiased estimate of the variance was used instead of the biased estimate.

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(2)For a description of the computer program for the IBM 360/67, see the unpublished SMSG paper "Item Analysis Program for Non-dichotomous Items" by W. E. Geeslin and Ed Cruz.

(3)Jaspen, Educational and Psychological Measurement, 1965, XXV, pp. 229-233.

(4)Jaspen, Psychometrika, 1964, 11, pp. 23-30.

(5)Wert, et al., Statistical Methods. New York: Appleton, 1954, pp. 256 cf.

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